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CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

October 1994

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**Race a
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-p.28



**Mid-Atlantic
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Thrash Tests

**SCHUMACHER
Storm 2000**

**DYNAMITE
Apex 10**

Future Tech: Novak's Hot New ESCs

USA \$4.50 CANADA \$5.50



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ON THE COVER: Dirt action! (Photo by Walter Sidas.) This page: Associated Worlds car. (Photo by John Howell.)

EDITORIAL

The movers, the shakers, the magazine makers



I've been involved with *Radio Control Car Action* for two years now, and I've seen quite a few things happen in the hobby. Two things have struck me while I've been here: there's a constant, almost overwhelming, flow of new and interesting products coming from car and after-market parts manufacturers; and everyone, from manufacturers to newcomers, shares a deep love of R/C cars. We at *Car Action* share this passion in a big way, and it's our mission to bring you the best coverage of this exciting and still quickly developing hobby. This brings me to the magazine—where it's been and where it's going—and that's what I'd like to talk a little bit about.

A lot of interesting personalities have contributed and continue to contribute to *Car Action*, but one person always comes immediately to mind—Chris Chianelli. His skills are invaluable. Yes, he always remained our "Scoop" reporter, but many of you wanted to see more of him in this magazine. Well, I'm glad to announce that, from here on, he'll be spending more of his time bringing the latest and greatest to you *Car Action* readers.

I'm also pleased to announce that former Associate Editor John Huber is now back with *Car Action* as a full-time staff member. As readers who have been with us for some years will recall, John's photography and writing skills are among the best in the magazine world; you're sure to see more spectacular work from him, too.

As for our captain, Frank Masi, his contributions and vision have helped to make this magazine the best R/C car publication in the world. Frank has done so well, in fact, that he has been asked to take the reins—in partnership with Tom Atwood, our Group Editor-in-Chief—of *Model Airplane News*. But don't worry—he's not completely leaving this magazine! Frank will continue at *Car Action* as a technical editor, so you'll continue to benefit from his input!

In these pages, you'll also continue to see the finest coverage of the R/C car hobby anywhere. We'll bring you the hottest action, the latest-breaking news and the coolest magazine possible. Please don't forget to write or e-mail us with your comments and suggestions; this magazine exists to serve you, our readers, and we need to know how to make it even better. Beyond that, just sit back, relax and enjoy the show!

We want to hear from you!

Write, fax, or e-mail us over the Internet: *Car Action*, Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897; fax: (203) 762-9803; e-mail: Chris Chianelli—chrisc@airage.com; John Howell (Doog)—johnh@airage.com; Karen Jeffcoat—karenj@airage.com; John Huber—jhuber@airage.com; Frank Masi—frankm@airage.com.

John Howell

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SUBSCRIPTION PRICES:

U.S. & Possessions (including APO & FPO): 1 year (12 issues), \$29.95; 2 years (24 issues), \$54.95. Canada: 1 year, \$45.95; 2 years, \$86.62 (includes G.S.T.). Elsewhere: 1 year, \$42.95; 2 years, \$80.95. Payment in U.S. funds. Single-copy prices: \$4.50 (USA); \$5.50 (Canada). Canadian G.S.T. number R130754872.

RADIO CONTROL CAR ACTION (ISSN 0886-1609, USPS 001-087) is published monthly by Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897, USA. Connecticut Editorial and Business Office, 251 Danbury Rd., Wilton, CT 06897. Phone: 203-834-2900. FAX: 203-762-9803. Michael F. Doyle, Chief Executive Officer; Y.P. Johnson, President; G.E. DeFrancesco, Vice President; L.V. DeFrancesco, Secretary; Yvonne M. DeFrancesco, Treasurer. Second Class Postage Permit paid at Wilton, Connecticut, and additional Mailing Offices. Copyright 1994 by Air Age, Inc. All rights reserved.

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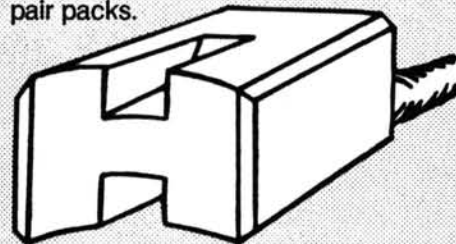
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LETTERS

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

DYNAMIC DURATRAX

"Fantastic" is the first word that comes to mind when I look through your magazine. I wouldn't prescribe it to a recovering R/C junkie, however! Here's my question: I recently acquired a DuraTrax GT-10 gas on-road car. Because of the low parts count and simplicity, it's easy and economical to run. Can I adapt, say, a 10L Associated dynamic front suspension kit to improve steering smoothness and decrease tire wear? Your help would be appreciated.

STEPHEN Malfatti

San Ramon, CA

I checked with Doogie on this, and there shouldn't be a problem adapting a front end from an on-road car like the Associated 10L. You might want to take a look at Trinity's Reactive Caster front end as well. Both units are extremely adjustable and will let you get dialed to any surface.

—John

KEEP IT CLEAN

In the June '94 issue, you printed a letter from Chris Wolf, who was looking for a safe motor spray to use on his R/C equipment. L.P.S. Laboratories in Tucker, GA, (800) 241-8334, makes a CFC- and trichloroethylene-free contact cleaner that's excellent for cleaning motors. I've been using this product for over a year now, and it does a great job on motors and bearings. The active ingredients are isohexane, isopropane and carbon dioxide propellant. You should always use a mask and a pair of gloves when using it. I keep a face mask in a plastic bag in my pit box and just slip it on whenever I use the spray. It only takes a couple of seconds to be safe.

DENNIS DEELEY

Bowmanville, Ontario, Canada

In the June '94 issue, someone asked if any motor spray was available without trichloroethylene in it. You said that Excel Products made some. I wrote to tell you that Bel-Ray has an ozone-safe motor spray that contains hexane.

I have a question for you, too. I've subscribed to your mag ever since I started in R/C. All this time, I've been looking at the great photos of R/C cars in action. I recently broke into the photography field and tried taking pictures of cars, too, but I can't seem to get them to come out right. I've tried many techniques and even bought a telephoto zoom lens, but I still can't keep them from smearing. How do you do it?

ANDY LINDEMAN

Layton, UT

Thanks for the info on the motor spray, guys! And as for your camera questions, Andy, well, you've come to the right place. When it comes to shooting R/C cars, no one is better than associate editor John Huber and me! [Modest, isn't he? — KJ] Basically, when we shoot action, we use 35mm SLR cameras, and we try to use a good mid-range to long telephoto lens or a long lens, i.e., 300mm. Use a shutter speed of 1/500 of a second for cars coming right at you and at least a 1/250 shutter speed for cars going past you sideways. Make sure you follow the car with your camera (panning) when you shoot it going past you!

For detail shots, we usually use anywhere from a 28mm to a 85mm lens and somewhere around a 1/250 of a second for a shutter speed. Sometimes we'll even use a flash to highlight static detail shots. Get really close to the object you're shooting, and make sure it fills the frame of your shot.

For the ultimate clarity and best color results, we both use 100-speed slide film (either Fuji or Kodak). If you're shooting

(Continued on page 92)

Team NOVAK

TEAM SECRETS

SERIOUS PERFORMANCE II



We've loaded our highest performance speed control, the **Hammer Pro ESC**, with all of the latest features to make it fast, durable, and trouble-free.

One of the new features, **Radio Priority Circuitry**, monitors battery pack voltage and automatically adjusts the throttle to prevent loss of radio due to low voltage. Radio Priority circuitry makes the car drivable after the battery pack has "dumped". **Hammer** the throttle when the car will barely move and you'll still have steering control. External receiver battery packs are a thing of the past with Radio Priority Circuitry.

Everyone knows that radio interference is not fun. To eliminate radio problems and allow the speed control to switch on the power faster, the Team Novak engineers added a digital anti-glitch filter. The high tech filter looks at the incoming radio signal and **knocks out** glitches before they cause problems. The number of glitches is reduced, and glitches that do get through are reduced in duration, giving the Hammer Pro the edge in radio reception over other brands.

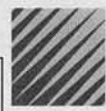
In case of an accidental application of reverse voltage, the Hammer Pro is fitted with **Solid State RVP**. Our exclusive system eliminates the need for a fuse, giving less voltage drop and more reliable operation. The Solid State RVP system automatically resets after the reverse voltage is removed so you don't have to fix a fuse. This is as safe and easy as it gets!

Look for the **Hammer Pro ESC** and the complete line of Team Novak high performance One-Touch speed controls at your local hobby dealer.

Team Novak welcomes your comments and secrets!

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WHAT'S NEW

DYNAMITE

Turbo Fueler

This assembled fuel bottle has a high-capacity, 500cc fluid reservoir—enough for numerous fill-ups. The clear reservoir allows you to see how much fuel you have left, and the 5½-inch-long aluminum filler tube makes reaching into "buried" fuel tanks a cinch. An airtight tube cap prevents fuel from spilling out, and it protects the fuel from moisture and other contaminants. When it's time for a pit stop, just squeeze and go!

Part no.—DYN2000; **price**—\$8.49.

Dynamite; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.



RD RACING DYNAMICS

Competition Diff Halves

If you run a Stealth™ transmission, you'll be interested in these precision-machined, hard-anodized diff halves with rings. Made of aerospace-grade T-7075 aluminum to a 0.002-inch tolerance for smooth, consistent action, each diff half is machined to accept both the stock diff rings and the new RD900 hardened, "keyed" rings that the diff halves come with. With a weight that's less than half that of the stock steel components, these diff halves reduce your tranny's rotating mass and give smoother, faster acceleration and better run times.



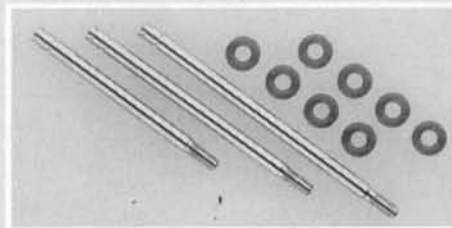
Part no.—RD1000; **price**—\$54.99.

RD Racing Dynamics, P.O. Box 369, Gardena, CA 90248; (310) 532-8533.

MIP

Golden Shock Shafts and Blue Seals

MIP's Golden Shock Shafts enhance the performance and reliability of your R/C car or truck. Made of high-grade stainless steel, micro-finished for smoothness and coated with titanium nitride for durability, they're available for Associated, Losi and Traxxas shocks. MIP's Blue Seals reduce friction on shock shafts, so there's less swelling and wear, and you'll have fewer rebuilds and oil changes.



Prices—Golden Shock Shafts start at 3.99 each; Blue Seals \$2.50/pack of 8. **Moore's Ideal Products**, 746 E. Edna Pl., Covina, CA 91723; (818) 339-9007.

BOLINK R/C Legends Cars with Trinity Motors and Battery Packs

The affordable, fun, R/C Legends cars allow beginners and experienced racers to really enjoy racing! Each kit includes a set of racing rules for you and your friends to follow, including specifics on what can (and can't) be



done to modify, so you can forget about shopping for R/C hop-ups! With the new motors and battery packs specially designed by Trinity, everyone has the same power, so everyone has the same chance to win! Get your R/C Legends team started today!

Part nos.—BL1343-C (Coupe kit with power by Trinity), BL1343-S

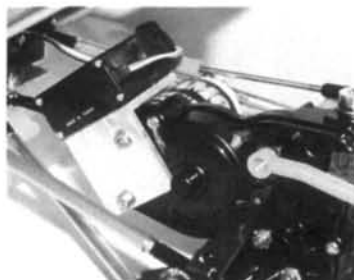
(Sedan kit with power by Trinity), BL1342-C (Coupe car kit only), BL-1342-S (Sedan kit only), BL-4009 (Trinity motor), BL-4709 (Trinity 4-cell pack); **prices**—\$129.95, \$129.95, \$89.95, \$89.95, \$22.95, \$19.95.

ESP Clod Buster Dual Servo Conversion Kit

ESP's new conversion kit allows Clod Buster owners to mount a servo directly on each gear case. The kit includes two heavy-duty machined-aluminum mounts that replace the stock motor covers. Each servo is then mounted directly above and behind the motor, where it's completely protected by the gear case and the lower bumper. This setup offers greatly increased steering control and torque, and bump-steer is eliminated. The kit includes all necessary hardware.

Part no.—ESP040.

ESP Hobby Manufacturing, 20 Crystal Lake Plaza, Crystal Lake, IL 60014; (815) 455-5440.



RPM Shock Body and Cap Wrenches

Tired of scratching your shocks when you try to take them apart? Check out RPM's new shock-body and cap wrenches. One is designed to fit the hex on the shock body, and the other fits over the cap's mounting hole. A simple twist separates the two; you don't need any other tools! Wrenches are available for Associated and Losi shocks.



Part nos.—7073 (for Losi shocks), 7078 (for Associated shocks); **price**—\$4.95.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366.

(614)231-4170

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Sanyo 1700SCRC-SP



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ESP 24D STOCK MOTORS

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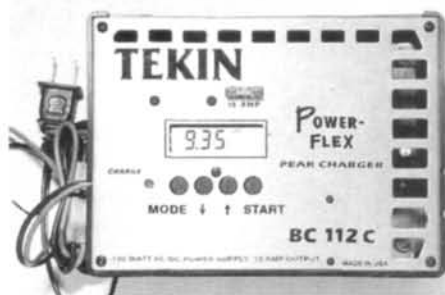
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WHAT'S NEW



TEKIN BC112 Chargers

Tekin's new, compact BC112A (DC) and BC112C (AC/DC) chargers feature microprocessor controls, custom digital displays, charge-capacity readouts, 0 to 10 amps and 1- to 12-cell charging, upgradable dischargers, special circuitry for cool operation, and the awesome Power-Flex battery-conditioning circuit that keeps cells running fresh and strong. Model BC112C has an efficient 10A, 120V, built-in AC power supply.

Tekin Electronics Inc., 940 Calle Negocio, San Clemente, CA 92673; (714) 498-9518.

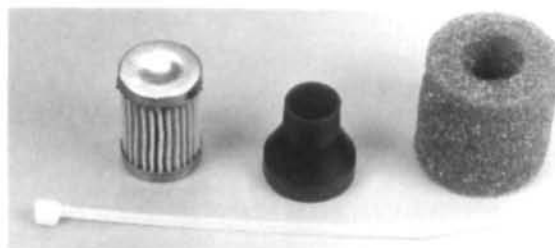
PRO-LINE

Quatro 2WD Front Tire

Pro-Line's new Pro-115 radial four-rib front tires were designed to handle the toughest corners! Features include radial rib design, XTR soft racing compound and performance design for harder track conditions. They fit any 2.1 front 2WD wheels.

Part no.—8115; price—\$10.50/pair.

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781.



TEAM ASSOCIATED

RC10GT Air Filter Kit

Protect your gas-filter investment with Associated's air-filter kit. It includes a paper air-filter element, a rubber air-filter boot and a foam pre-filter. (Items are also sold separately.)

Part nos.—7705 (kit), 7706 (paper air-filter element), 7707 (foam pre-filter), 7708 (air-filter boot); prices—\$7.50, \$2, \$2.50, \$3.

Associated Electric Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342.

Team Losi Tech Talk

KEEP 'EM SEALED!

If you own a Double-X car, you're probably familiar with the special Teflon® sealed front bearings. These seals help the bearings last up to 10 times longer. Bearings with these seals aren't a standard item, and they must be special-ordered by Team Losi. For this reason, it isn't possible to offer them in all sizes. Team Losi has come up with a solution to this problem and now offers these special seals as an add-on item. These seals (part no. A-6918) are available for the 3/16x3/8 bearings. These bearings are used for the rear axle as well as the output shaft in the gearbox.

INSTALLING THE SEALS

The easiest way to install them is to first carefully remove the small ring around the outside of the standard shield with a sharp hobby knife. This will require some patience and a steady hand. Once you've removed the shield, replace it with the Teflon® seal and reinstall the small retaining ring. Extra rings are included, because they're very small and easily lost or damaged. Repeat this procedure for both sides of each bearing. If you're replacing shields on older bearings, it's a good idea to re-grease the bearing before you install the new seals. The Teflon® seals keep dirt, dust and other unwanted particles out of the bearings. If installed on new bearings, the life of the bearing can be up to 10 times longer than that of a standard bearing.

SPINNING TRUE

Here are a couple of quick pointers to help you mount your tires so they spin truer. First, trim the inside edge of the foam insert. This will allow more room for the ribs of the wheel and the bead of the tire. Next, trim any flashing from the inside of the bead on the tires. This can be done with a pair of hobby scissors. It's a little easier if the scissors are slightly curved. Once the flashing is removed, install the trimmed tire foam and work it around the inside of the tire until it's centered. By completing these simple steps, your tires will spin much truer than if you just quickly glue them to the wheels.

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

AMERICAN HOBBY SPECIALISTS

Plasti-Strip

This new product will strip paint from plastic without hazing or making the plastic brittle. Just submerge your car's body in Plasti-Strip for 10 minutes, and rinse it in warm tap water. Plasti-Strip also removes paint from aluminum, brass and die-cast metal.

Prices—\$7.49/16-ounce bottle, \$3.99/8-ounce bottle.

American Hobby Specialists, 386 Canfield Dr., Gahanna, OH 43230; (614) 471-2666.



HITEC

Challenger Radio/Speed Controller

This 2-channel radio system includes a BEC receiver, servo reversing, an unbreakable steering clutch, pistol reversibility for easy right- or left-hand use,

a low-battery-warning LED, neutral throttle and steering adjustments and two HS-300 servos. What could be better? It's now available in a combo pack with Hitec's all-new SP-520+ speed controller. The SP-520+ features "Cool Protection"—a polarity protection circuit that prevents you from connecting the circuits backward. Get high performance and cool protection!

Part nos.—HRS0375 (260), HTS0775 (combo); **prices**—\$69.95, \$99.95.

Hitec RCD Inc., 10729 Wheatlands Ave., Suite C, Santee, CA 92071; (619) 258-4940.



TAMIYA

Hop-Ups

For souped-up power, weight savings and durability, Tamiya offers more than 100 hop-up and replacement parts for their 4WD 1/10-scale touring cars and rally racers. Available parts include: high-torque servo-savers; machined-aluminum wheels; high-grip, super-slick tires; speed-tuned gear sets; low-friction aluminum shocks; torque splitters; brake-light sets and more!

Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656; (714) 362-2240.



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INSIDE SCOOP

by CHRIS CHIANELLI



IN SEARCH OF FUN AND GLORY, 'CAUSE LIFE'S TOO SHORT TO BE A SHEEP!



RECOIL COBRA

New from Hobby Lobby are these 1/10-scale 2WD and 4WD gas-powered Cobras. Both feature anodized-aluminum chassis; aluminum, oil-filled shocks; fully independent suspension with adjustable toe-in and camber; a ventilated brake; and Teflon clutch shoes. The Leo .15 engine has a recoil pull-starter and a muffler. The Cobras come 80 percent built; just paint the body, bolt on the wheels and install your radio. The 2WD Cobra is \$199, the 4WD is \$229, and the 4WD conversion kit for the 2WD Cobra is \$33. For \$89, you can convert the 4WD Cobra to 6WD and create your own Road Warrior machine. Contact Hobby Lobby Intl. Inc., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.



Robohead

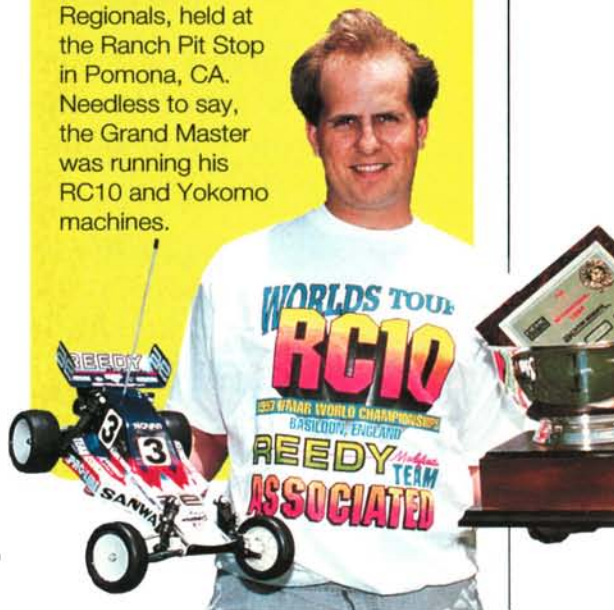
RPM's new rear bulkhead for the Associated RC10GT is extremely heavy-duty—very tough! It's strengthened in all the right places to cope with the abuse doled out by fast, aggressive gas race trucks.

It's injection-molded of white, dyeable, nylon thermo-resin. Contact RPM Custom Engineered R.C. Products, 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.



Grand Master Mark

Leeds, England—Competing against the best Europe has to offer, Team Associated driver Mark Pavidis not only won the Reedy International Off-Road Race held in England this past spring, but he also returned home just in time to take the 2WD and 4WD classes at the ROAR Off-Road Regionals, held at the Ranch Pit Stop in Pomona, CA. Needless to say, the Grand Master was running his RC10 and Yokomo machines.





Double-XT Stadium Slasher

It's finally here. After months of rumors on the racing scene, Team Losi's new trick truck, the Double-XT, is shown here for the first time. Based on the Double-X buggy, the truck is entirely different from its predecessor, the LX-T. The Double-XT features new shock towers, front and rear bulkheads and ultra-long suspension arms, and it has the same Losi-G tunnel chassis design as the awesome Double-X buggy. It also comes with a really sharp-looking new body. According to the Losi team, the new truck is superior to the LX-T in all arenas: it handles better in the rough whoops, it's more stable on fast tracks, and it also has a better in-flight attitude over jumps. We'll do a full-blown test on Losi's newest offering in our January issue, so stay tuned!



Less is More

actual size

Not only is Hitec's new HS-205 (HS-205 MG metal-gear version) mini-servo 20 percent smaller and 30 percent lighter than their standard sport servo, but it also has more torque (44 oz.-in.). At 4.8 volts, its transit time is 0.20 second, measured through a 60-degree sweep. The versatile HS-205 sounds perfect for when the job is big and the space is small. Contact Hitec RCD Inc., 10729 Wheatlands Ave., Ste. C, Santee, CA 92071 (619) 258-4940; fax (619) 449-1002.

GET A GRIP.

Gettin' sideways is cool if you're running dirt oval, but if you're racing on carpet or asphalt, it doesn't cut it!

To improve foam tire performance on hard surface tracks, the race team worked with the chemical engineers at Trinity to develop Zip Grip™, a custom, hand blended R/C foam tire traction compound.

Using Zip Grip provides the most precise and repeatable tire performance on carpet or asphalt R/C racing tracks, of any formula available today. And, the new style applicator keeps the Zip Grip on your tires and off your hands.

So if you've been getting entirely too familiar with the turn marshals, it's time to "get a grip" with Zip Grip!

TRINITY®

1901 E. Linden Avenue, #8, Linden, NJ 07036 ■ 908.862.1705 ■ Fax 908.862.6875



Tamiya R/C Championship Series

Race 2

The latest Tamiya Championship Series was held at Ultimate Hobbies in San Jose, CA. The race was a huge success, having more than 100 entries in the F1 and Sedan Modified classes. Here, event coordinator Eric Sands congratulates first-place Sedan Modified trophy winner Tom Aakre. Other top finishers in that class were Hobie Kaptan, second, and Chris Brick, third. Top F1 finishers were Mark Rebek, first; Kevin Lockerby, second; and Fred Medel, third.

Ultimate Hobbies routinely runs night races under halogen lighting, and competitors often paint their cars bright colors and install headlights and taillights for the ultimate in realism. Track conditions also change when the weather goes from warm and sunny to cool and damp, adding further scale-racing excitement. Ultimate runs many classes of on-road racing, including those ever-popular, fast, great-looking Formula 1 cars. For more information, contact Ultimate Hobbies, 2143 N. Tustin Ave., Orange, CA 92665; (714)-921-0424.



PYTHON

2 CHANNEL DIGITAL PROPORTIONAL RADIO CONTROL SYSTEM

Striking Back on the Track

JR

Coming soon from the maker of the high-tech R-756 computer radio is a new sport pistol system that will help you snake your racer through the toughest turns. Besides

having all the expected standard features, such as servo-reversing and BEC circuitry, JR's new Python radio has a carefully contoured and balanced "Bio-Shape" grip. The

best part of all: the Python won't constrict your budget. Very charming. For more info, contact Horizon Hobby Distributors at (217) 355-9511.

®

Winning is What Separates Champions From Everyone Else. And We've Won It All!



Team

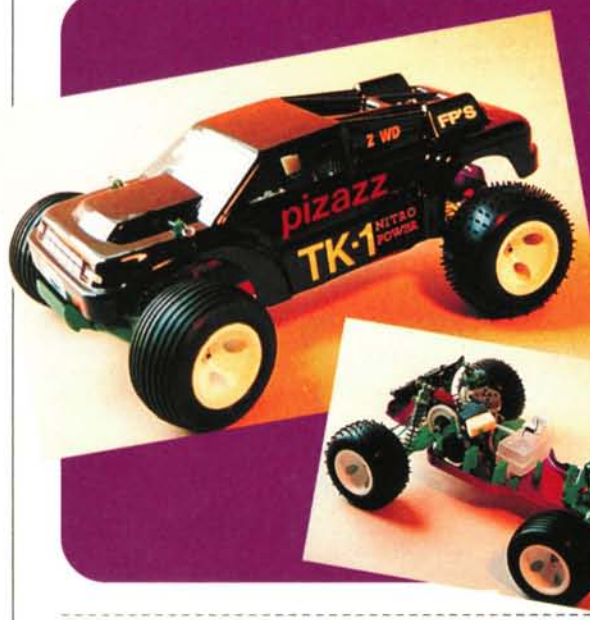
PUSHED

- ☐ IFMAR 1/10th, On-Road Modified World Championship - Joel Johnson
- ☐ ROAR 1/10th, On-Road, Modified National Championship - Joel Johnson
- ☐ ROAR 1/12th, On-Road, Modified National Championship - Joel Johnson
- ☐ 4-Cell Modified Winter Nationals Modified Championship - Mike Blackstock
- ☐ U.S. Oval Masters Modified Championship - Mike Blackstock
- ☐ ROAR 1/10th Speedway Modified National Champion - Ernie Bucci

Trinity Team Pushed battery championships are all in super-competitive national and international modified pro-class racing, not in stock or regional events.

Trinity Products Inc, 1901 E. Linden Ave #8, Linden, NJ 07036 • (908) 862-1705 • Fax (908) 862-6875

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PIZAZZ TK-1

Racer's Choice announces their new $\frac{1}{10}$ -scale gas-powered Stadium Racer, manufactured by Flying Point. The TK-1 is powered by a pull-start Leo .15 and is 90 percent factory assembled. Just paint the body, mount the radio and tires, and go racing! Features include anodized-aluminum shocks, composite suspension arms, an aluminum-tub chassis, a planetary gear differential, a muffler with a dual exhaust pipe and a built-in fuel primer pump. Check out those Batman colors. For more info, including prices, contact Racer's Choice R/C Products, 6N258 Acacia Ln., P.O. Box 405, Medinah, IL 60157; (708) 980-4863; fax (708) 980-5420.

The Penske of Parking Lot

We're so jazzed about this car; it's one of the wildest-looking machines we've seen in a while. This monocoque graphite chassis designed by HPI (the people who have already brought us the fastest R/C cars in the world) is available for the Tamiya 103 series F1 cars. It's a two-piece woven carbon-fiber set (one



bottom piece, one top piece) that's bonded together to form an extremely rigid chassis. Although it might not be legal for Tamiya's R/C Championship Series races, it will make you the king of the parking lot. According to sources at HPI, the chassis will retail for about \$300+. Our unit should be here shortly, and as soon as we've finished fighting over who gets to test it, we'll show you a little more about it and a few of HPI's other car hop-up goodies. Be prepared!

PHOTO COURTESY OF HPI JAPAN



hanks to Dahm's Racing Bodies, now you can scorch the local track with your $\frac{1}{10}$ -scale pan car with an open-wheel favorite such as this N.D. Racing Body™. It features

Open-Pan Cooking



1994 Penske Indy Car "shark-fin"-type styling, and it's designed to fit most $\frac{1}{10}$ -scale on-road chassis, such as the Associated RC10L and the narrow RC10LSS. Contact Dahm's Racing Bodies, P.O. Box 360 Cotati, CA 94931; (707) 792-1316; fax (707) 792-0137.



Welcome Back, John Boy

I just wanted to express my personal approval of John Huber's return to the internal goings-on at this crazy office. It really is good to have him and his technical expertise in-house full time. That happy Waltons' theme song once again fills the Air Age ether with glee. Shucks, Ma! As you can see from the picture, John's indoctrination has resumed and is in full swing.

READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah of Radio Controlla chooses your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fourth annual "Reader's Ride of the Year Contest" in the fall of 1994. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



ALTITUDE ADJUSTMENT

Javier Ramirez's high-flyin' RC10T Team Truck is relatively stock. Javier, who resides in Tempe, AZ, equipped his truck with a Novak 410 M5, Airtronics radio equipment and a Peak Performance motor. Team Associated 40WT silicone oil provides smooth damping on landings after attempting those extra-long jumps. A Team Associated battery pack provides the juice for the truck.



PANEL POWER

This wild-looking '34 Ford Panel truck based on a Bolink Super Sport chassis belongs to Cliff White of Buhl, ID. The car is equipped with wheels and tires from Parma's Hemi Coupe, full ball bearings, a 1400 SCR battery pack and a Joel Johnson II motor. The car is controlled by a Futaba MC210B ESC, a Futaba S132H servo and a Magnum Junior radio. Cliff, who has been into R/C cars for the past six years, painted the body himself using spray cans! It looks pretty sharp, Cliff; good job!



CABBIE POWER

Well, it looks as if New York City's Raymond Bock will never have to wait too long hailing a taxi; he built his own. His taxi of choice is an RC10 topped off with a '55 Chevy body that's decked out in checkers and on-road tires. A Trinity Monster Horsepower motor and a new Novak Rooster ESC power the vehicle. We're curious: is the fare scaled

down as well? It looks as if "25 cents for 1/5 mile" is written on the side.



KEEP ON TRUCKIN'

This hot-looking Tamiya King Hauler belongs to Stanley Abbruzzi of Swansea, MA. Stanley spray-painted his truck with this intense

metallic turquoise and hand-painted all the other details on the truck. He also added a light kit, a roof spoiler, a reverse beeper and a fire extinguisher. All you need now is the trailer, Stanley, and you'll be all set to hit the road in style!

READERS' RIDES



TOMB ZOMB

This hot-looking Grave Digger started its car-crushing life as a Kyosho Hi-Rider Corvette, and then it slowly began to be transformed into the monster you see before you. Owner Jim Marshall of Charlotte, NC, added a few goodies to the truck. His mods include a stretched-out aluminum chassis, two Thorp diff kits with dogbones, two Trinity Speedworks Sapphire motors, full ball-bearings, eight Kyosho Gold shocks, a Tecnacraft tie-rod set, Pro-Line tires with foam inserts, an Airtronics radio system with a 94152 high-torque servo, a Novak 410-MXC ESC, two Racer's Edge 7-cell battery packs wired in parallel and a 5-cell Dynamite receiver pack. A Parma body tops it all off.

FIERY 10

After seeing the killer paint job on the Kyosho Inferno 10 that we reviewed in our April '94 issue, Lawrence Pepper of Millville, NJ, called up body-painter Mort Flint Jr. and had him paint an identical body for his Inferno 10. The car is equipped with ball differentials and Equalizer shocks, and a high-torque Airtronics 94152 servo steers the beast.



KEEPIN' COOL

Dustin Knutson's sharp Team Losi Junior-T has been modified with a full set of ball bearings, a Tekin 410S speed controller and a Trinity Slot Machine motor, and it's controlled by an Airtronics XL2P radio system. According to Dustin, he and his father spent a lot of time trying to figure out the paint job. Using an airbrush, they experimented on scrap pieces of Lexan and came up with the wild design that you see here. Good job, guys; the truck looks pretty smokin'.



PARKING LOT

This interesting-looking vehicle belongs to David Schleinkofer of Morrisville, PA. The car is a custom-built project that he made using a Bolink front end and rear T-plate and pod. Both the front and rear suspensions were designed to pivot, and a tri-shock rear suspension system was added. Running gear includes a Futaba radio and a S-148 steering servo and a Novak T-4 ESC. The body is from a Sears Lobo/Nikko Hurricane (David's first R/C car), and he added to it so it would look like an Indy car. According to him, the car is great for parking lot racing because of its "glued to the road" driving style.

TROUBLESHOOTING

by JOHN HUBER

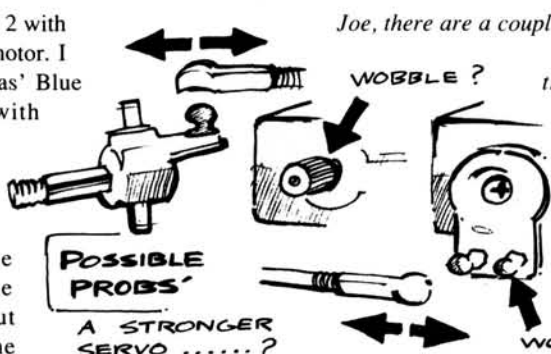
Illustrations by Steve Collins

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton, CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

Straighten up

I have a Traxxas Rad 2 with a Slot Machine 2 motor. I added a set of Traxxas' Blue Eagle dish wheels with DuraTrax Street Traction tires. I spend about 20 minutes before each run re-centering the servo and setting the steering straight. But after a few turns, the steering is either pointing left or right, and the trim doesn't help at all. The steering servo is an Airtronics 94102, and the servo-saver was supplied with the car. What's causing this? Should I buy a better servo? Help me, please!

Joe Von Kamp, Collins, OH



Joe, there are a couple things that might be causing the problem. First, make sure the servo-saver properly fits the servo's output shaft. Each servo manufacturer makes output shafts that are a different size, although they look very similar. If the wrong servo adapter is used, there's a good chance it will slip and change the neutral setting when you bump something. If the proper servo-saver is being used, then you might have a damaged gear inside the servo. Open up the servo and check the gears for missing teeth. You can get replacement gears for less than \$10.

Tracker trouble

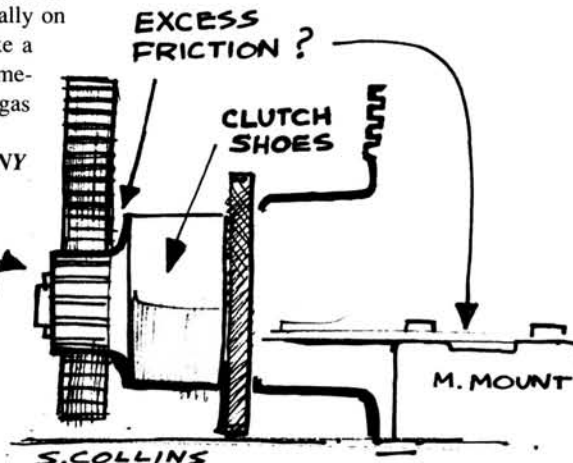
I just received a gas conversion kit for my Kyosho Tracker. It works well as long as I'm partially on the throttle. If I let it sit and idle, it will make a quick grinding sound as if it's catching on something, jerk a little bit and stall. It's my first gas kit, and I don't want to ruin it. Please help!

Jason Warner, Harpersfield, NY

Jason, if the clutch bell rubs on the flywheel slightly, it will do exactly what you described.

Check to see if you can add a washer behind the clutch bell to give it a little space. Also make sure you put a little lube on the needle bearing so it won't bind up.

BAD BEARING
I
SEIZED?



Save that servo!

I have a couple of problems. First, I own a Traxxas Hawk 2, and I recently purchased an Airtronics XL-2P for it. The steering servo's gears broke, and it stutters. Should I get new gears for it, or should I buy a new servo? My second problem is that I tried my other servo, and it won't work. The remote's power light is on, but nothing happens. I was just wondering if it's the crystals, or if I need a new receiver. Please help and great mag.

Rickey Jensen, Waukegan, IL

Rickey, first remove the broken servo and try the other one in both channels. If you get no movement, it could be the receiver or the servo. If it's new, it should still be covered by the warranty, so send it back ASAP. As for fixing the servo, send it back with the radio, and have the manufacturer fix it. It's worth fixing a broken gear in a servo once. If you keep hitting something and

the gears keep stripping, then you need a better servo-saver and/or a stronger servo.



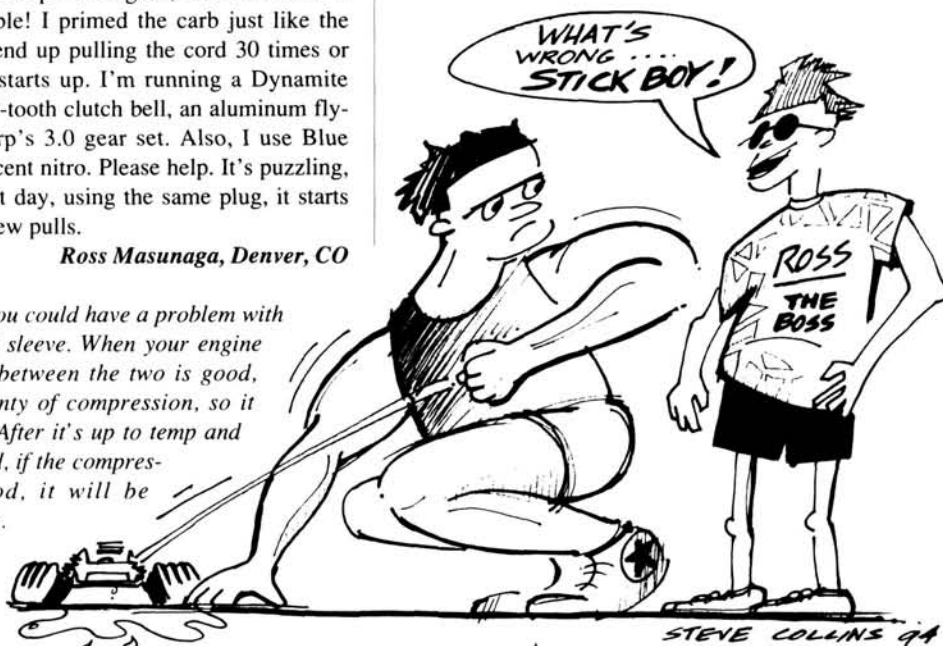
Confounded compression

I recently bought a Traxxas Nitro Hawk and have one recurring problem with it. The first run of the day, the engine starts right up with only one or two pulls of the cord. When the fuel runs out, or I pinch the fuel line to stop the engine, the next start is almost impossible! I primed the carb just like the first run, but I end up pulling the cord 30 times or more before it starts up. I'm running a Dynamite tuned pipe, a 17-tooth clutch bell, an aluminum fly-wheel and Thorp's 3.0 gear set. Also, I use Blue Thunder 20-percent nitro. Please help. It's puzzling, because the next day, using the same plug, it starts up with only a few pulls.

Ross Masunaga, Denver, CO

It sounds as if you could have a problem with your piston and sleeve. When your engine is cool, the fit between the two is good, and there's plenty of compression, so it starts right up. After it's up to temp and the parts expand, if the compression isn't good, it will be difficult to start. Try turning the

engine over by hand when it's cool and after it heats up, and see if it's the same. If not, then you need a new piston and sleeve. Also, make sure that the head bolts are tight and not leaking.



No time for timing

Right now, I'm very fearful that I've just wasted \$40. I hope that I'm just overreacting to the situation. Well, this is what I did. I recently purchased a very fine piece of equipment—the Trinity Armageddon motor. I wanted to make it run at its peak performance so I took it apart. First, I added some Holley headers; I bored it out to 0.010 inch (just joking, of course). Actually, I checked the shims and lubed up the bearings. Here's where I goofed up. I went to put it back together and realized I had forgotten to mark the timing on the hood and can. I know dynos can find the right timing again but what can I do if I can't find anyone who has one? I've heard so many horror stories about reversed timing or loss of performance because the timing was off, so please, please, please help!

Michaelangelo Deux, Hammond, IN



Mike, I guess you've never heard of the saying, "If it ain't broke, don't fix it." But don't worry, you can fix it again. To set it up with zero degrees of timing, the screws that hold the endbell to the can should be centered between the two magnets. This is a good place to start. If you put it together and it runs in the wrong direction, you must rotate the endbell 180 degrees. With zero degrees of timing, you'll be safe, but the motor won't be as fast as it could be. To set the timing to its optimum setting, you'll need a dyno. If you can't find a friend or a shop with a dyno, then send it to Trinity and have them check it for you.

Include your receipt (if you have it) and your phone number. You might want to run the motor for a while and send it in when it needs the comm cut as well.

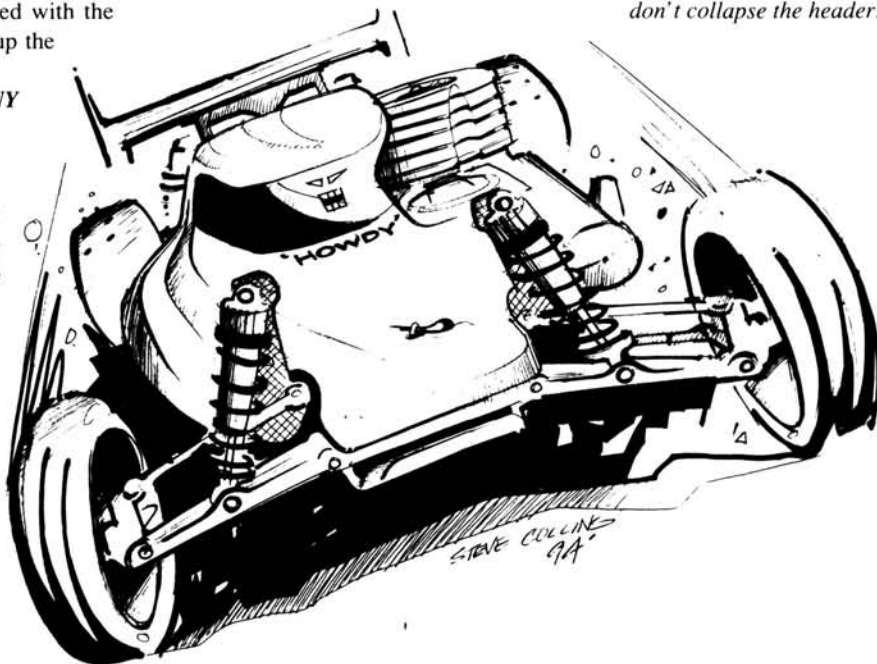
Big-bore Sandmaster

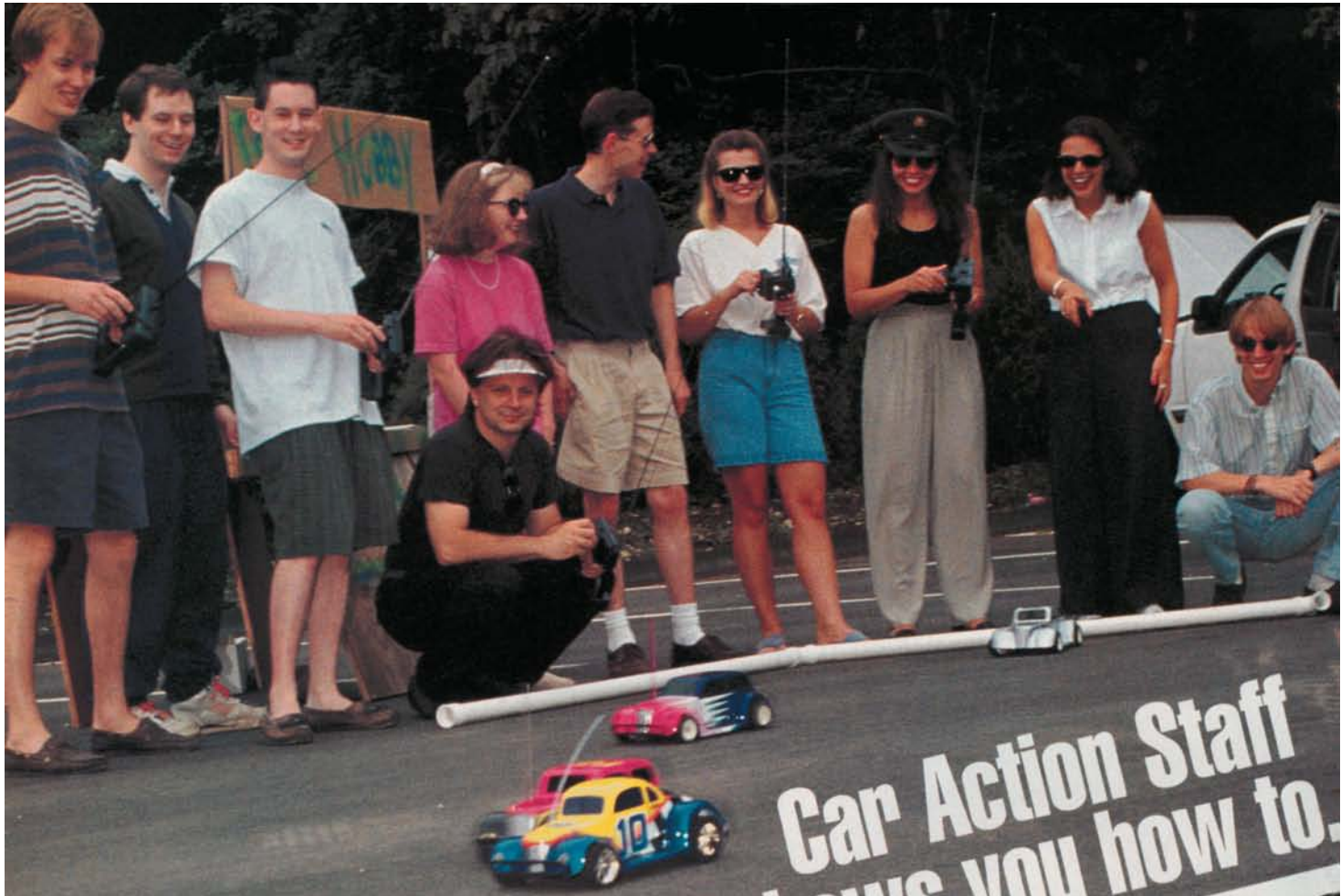
I own a Kyosho Sandmaster, and it's powered by a Kyosho GS-11 engine. Could I put an O.S. .12 CZ-R or a Leo .12 in the car? If one of those engines works, would I have to use the engine mount that comes with the Sandmaster that has the O.S. .10? Is there a tuned pipe that can be used with the GS-11? Great mag, keep up the good job.

Narven Singh, Queens, NY

Narven, I think you can install the CZ-R in the Sandmaster, but it will take some work. You should be able to use the existing motor mounts, but you might have to drill some holes to get it to line up properly. As far as the tuned pipe goes, any pipe for a .12-size engine will do, but the problem is the header. Quite a few headers will fit the

engine, but because the engine on the Sandmaster tilts forward, finding one that will fit properly will take some work. Right now, I don't know of any that will fit exactly, but you might be able to modify (bend) one to the desired shape. Be careful when you bend it so you don't collapse the header!



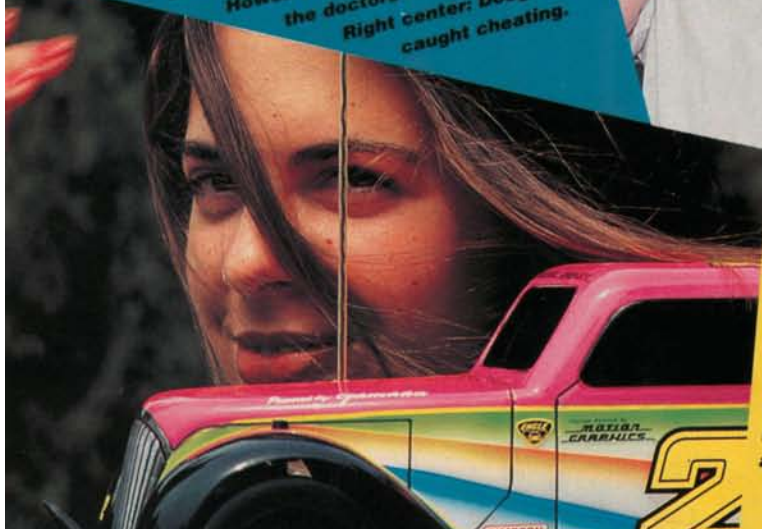


Car Action Staff shows you how to. **START Y**

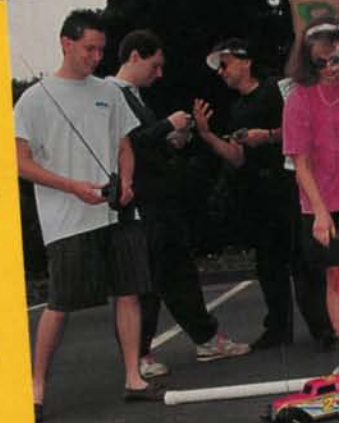


Hassle-free R/C
35 MINUTES

Below: the sultry Lisa "Isabella" Molinaro, Air Age summer intern, looks better than a Cars album cover. Pictured here with a '37 Chevy Legend car, Lisa's nail polish and Motion Graphics' hot paint scheme are a perfect match. Right: we had editor "Doogie" Howell's cranium X-rayed. What did the doctors find? A black hole! Right center: Doogie is caught cheating.



Right:
pre-race excitement;
left to right: the cheater; the
bookie (me) taking a last-minute
bet from our systems manager,
Gordon "Bishop" Oppenheimer;
copy editor Nora Madden tells her
car to "sit!"; John Huber; Frank
Masi; Tammie Downaré; Admiral
Yvonne "The Boss" confidently
places a Legend car with her ath-
letic arm; Lisa Molinaro; and Scott,
a local who always crashes our fun.



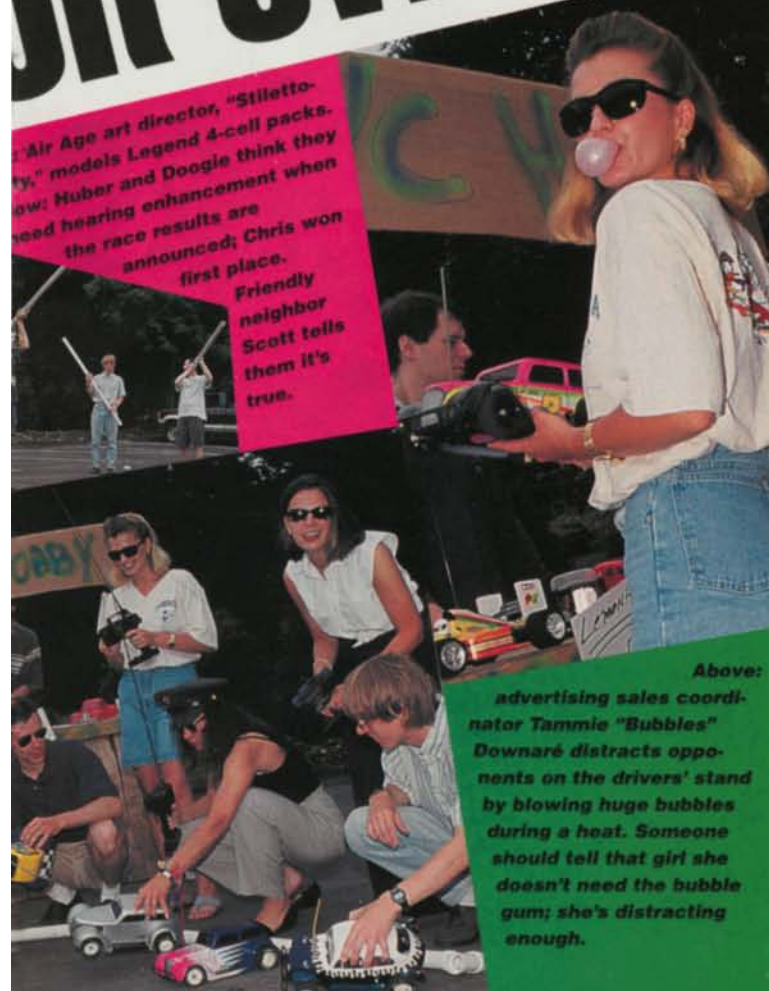
The beautifully painted Legend bodies in this article were painted by Richard Muise of Motion Graphics*. To the far right is a Legend car with Parma's VW Beetle body.



OUR OWN RACE CLUB

by Chris Chianelli

Air Age art director, "Stiletto-ty," models Legend 4-cell packs. Now, Huber and Doogie think they need hearing enhancement when the race results are announced; Chris won first place. Friendly neighbor Scott tells them it's true.



Above: advertising sales coordinator Tammie "Bubbles" Downare distracts opponents on the drivers' stand by blowing huge bubbles during a heat. Someone should tell that girl she doesn't need the bubble gum; she's distracting enough.

PHOTOS BY WALTER SOUSA & CHRIS CHIANELLI

I don't care what you call it—box stock, spec class, or parking lot racing. All of these were conceived for one reason: to keep people, especially young people, in the hobby by keeping the hobby fun. Obviously, a preponderance of excitement in this hobby centers on racing, especially when you race against your

Fair is Fair... Doogie cheats, Doogie loses

obnoxious best-buddy friends! But racing is neither fun nor exciting if you have no chance at all of winning.

There has been much talk on this subject within and without the industry—talk about how things have become so high-tech and expensive. Till now, little more has happened than talk. The topic has risen within the pages of *Car Action* many times, so we, too, are guilty of talk-talk. Magazine work, however, may be characterized as a lot of talk between two covers, albeit with photos thrown in. So I guess you could say we've been doing our part.

Few will disagree that Bolink R/C Cars Inc.* of Lawrenceville, GA, has certainly done its part by designing a car, called the "Legend," around which an R/C race club can build a cost-controlled, highly competitive form of racing in which the level of individual competitiveness is not directly proportional to the thickness of the wallet—racing that could bring back fairness, fun and, most important, the kids. If you disagree, drop me a message on the Internet at chris@airage.com, and tell me why. Be advised; it's already happening cross-country.

START YOUR OWN RACE CLUB

The Legend cars are simple, sturdy and have exciting scale appearance. (Look for a full review in *Car Action* in the very near future.) The best part is a list price of only \$89.95 (minus electronics). Applying reasonable discounts means that you can take one home for about 60 or 70 bucks.

For some time, I've wanted to get some of the staff here at *Car Action* involved in an office challenge, but I never seemed to quite get my act together. Bolink supplied the necessary incentive with the timely introduction of the Legend Series Car. Obviously, this company understands the current needs of the hobby and how to make it fun again for the hobbyist on a budget.

Hopefully, the rest of the industry understands this need and supports such events. Trinity has already responded by supplying the official



Here's the Legend-approved motor (Trinity part no. 2028; Bolink no. 4009) and 4-cell pack (Trinity no. 5901; Bolink no. 4709) that are manufactured by Trinity and distributed by Bolink and Trinity. A 6-cell Legend pack (Trinity no. 5902; Bolink no. 4708), not shown, is also available.



Here, a right-angle turn is quickly formed using a 90-degree coupler. Straight and 45- and 22-degree "T" couplers are also available. Assembling our track took only 35 minutes, even with much dawdling on the part of Doogie.

Legend motor and battery packs. The logic of a race based on Bolink's Legend car isn't at all difficult to grasp. If your local hobby dealer doesn't get it, go explain it to him, and take along your friends. Tell him you want to start "Legend Night" in his parking lot. If he's a smart business man, he'll listen and understand the potential for his business. You're his customers; the time has come for you to tell him what you need. If a hobby dealer isn't close by, start your own race club. All you need is a parking lot and the desire for some evenly matched race excitement.

The pictures don't lie and neither do I: here's how we have fun. Here's how you can have fun.

Coast to Coast

Here's a little info you might find helpful and encouraging about two hobby dealers—Hobby Shack of Fountain Valley, CA, and R/C Hobbies of Fort Lauderdale, FL, that have already added a "Legend cars only" class to their existing parking lot program of F1/Indy, 4WD/FWD sedan and gearbox classes.

R/C Hobbies' track, which is laid out in approximately 30 minutes on Sundays at noon, is constructed using the same method we use for our staff races here at *Car Action*: 2-inch-diameter PVC pipe sections joined by 90-, 45- and 22-degree "T" and straight couplers. You can cut and arrange the pipe to create virtually any type of layout. A hacksaw works best for cutting the pipe. PVC pipe comes in various grades; the cheap stuff is all you'll need. Large, resealable plastic bags filled with sand and laid over the pipe are perfect for holding your track borders in place. Because it must be easy to transport, Hobby Shack's track design is modular, and all parts fit into their drivers' stand, which, when broken down, forms two crates that can be loaded into their truck. Here's what Hobby Shack's Mike Greenshields told me about their portable track.

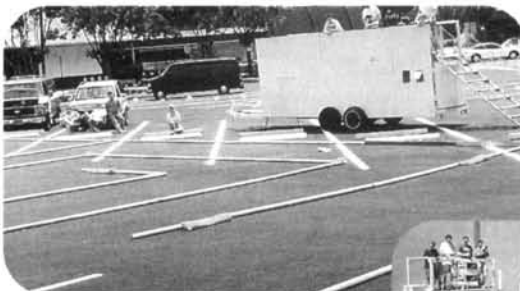
"Our races are run by a standard computer program with manual entry. The infield is made of retired fire hose and plow disks purchased from fire- and farm-equipment suppliers. (If fire hose isn't available, garden hose has been used successfully.) Despite its portability, the track has a professional and permanent feel to it.

"At each race, we will supply a tech table where any customer/racer with a question or problem concerning his/her racecar can get information and help setting it up. It doesn't matter whether you need assistance in soldering a motor or setting up the suspension, or advice about tire selection, our "Tech Experts" give free advice and help to all. The event is supported by professional employees providing support to all entrants and spectators. All employees are easy to identify in their Hobby Shack shirts.

"We have a PA system to announce all events. Our concept is to make all entrants feel as if they have really been a part of an exciting event at which everyone has a chance to win. Many vendors agree with this ideology and have donated numerous small prizes so that we can give them to as many entrants as possible. Every entrant receives a raffle ticket and a chance to win something. Also, Tamiya donated a huge amount of posters that feature various Tamiya cars; each entrant will receive one. Additionally, all events are set up so that the guy with the least amount of money invested in his car could actually win. Each Main winner, places 1 through 3, receives a Hobby

Shack Gift Certificate that's good toward any purchase in any of our nine stores, or toward his/her next entry fee."

I think Hobby Shack's effort can serve as an outline



Above: this track layout by R/C Hobbies of Ft. Lauderdale, FL, uses PVC pipe. Note the long sandbags that hold the track in place. The entire track is loaded into the drivers' stand/trailer for transportation. Right: Hobby Shack's track is loaded into the store truck for traveling the race circuit. Note the use of old fire hose and plow disks. Old garden hose has also been used very successfully.

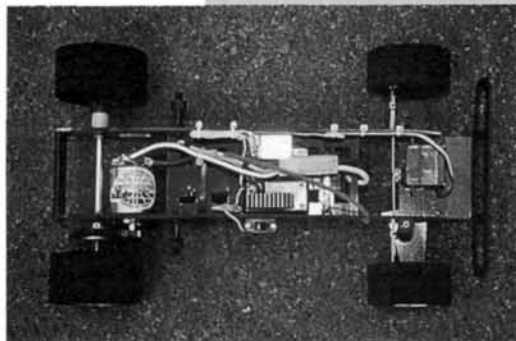


from which other dealers can get their own program started. Although their rules do vary somewhat from Bolink's, they still ensure fair yet hot competition; everyone has a shot at the winners' circle, regardless of his/her budget. Hobby Shack has parking lot events at their Fountain Valley, Riverside, San Diego, El Cajon, Encino and La Habra store locations. For more information and race schedules, give the main office a call at (714) 964-8846.



START YOUR OWN RACE CLUB

The Company—The Concept



Designed for smooth surfaces, the Legend chassis has direct-drive with a ball diff. Kingpin coil spring suspension is at the front only. It's simple and strong. Note tread cut in foam tires for better traction on dusty surfaces. The car is equipped with a Hitec SP-1802N speed controller and RCD Shredder micro receiver. The Legend 40 Ford has great appeal with Parma/PSE chrome wheels.

Founded in 1971 and headed by Bob and Kathy Rule and Rick Jordan, Bolink has been in on the radio-control phenomenon from the beginning. Their understanding of the hobby, and the hobbyist's needs, should come as no surprise.

Moreover, Bolink is a hobby company run by business people who are also hobbyists. In 1976, Bolink pioneered the development of the 1/12-scale electric car. When the father of the electric car, Wayne Palmer of Ft. Wayne, FL (he had his own fort!), took a Cox Jerabee chassis and powered it with batteries and a motor from a Black & Decker electric

grass shears, he had created the first 4-cell electric car. Seeing the potential, Bolink bought the rights, added their own wheels and body and subsequently marketed the first 4-cell car worldwide!

Bolink has since racked up many firsts in the industry. In 1980, they won the "Creative Award of Excellence" from the Hobby Industry Association of America for their Round Tracker design. In 1981, they began computer-controlled wind-tunnel testing. The tunnel was designed by GM engineer Marv Thompson. In 1984, they led the way by producing the first 1/10-scale on-road car kit. In 1985, they officiated racing by importing the AMB lap-counting system from Holland; this system has scored every major race in the history of the sport, including all the world championships. They were the first to market a superspeedway car—the LTO (left-turn only) with all the batteries on the left side. The list goes on and on. The point is, Bolink has always recognized the needs of the industry and come up with interesting, cost-effective solutions. The Legend car is the latest example of this creative ingenuity.

Modeled directly after the full-scale Legend cars, the 1/10-scale Legend



is true to its namesake in both appearance and concept. Powered by 4-cylinder Yamaha motorcycle engines, the full-scale Legends are also a cost-controlled (everyone runs the same equipment) concept in full-scale racing. A ready-to-race Legend costs about \$10,575. The cars are raced bone stock; driving ability is the deciding factor. Sound familiar? That's exactly what the R/C Legend Series is all about. Oh, yes; the full-scale Legend program has proven to be a tremendous success. Back orders abound.

With 20 years in the R/C manufacturing business and five national championships to their credit, the people at Bolink still remember their original motto:

"Complex enough to perform; simple enough to enjoy." We at *Car Action* second that motion.

Since Bolink is the creator of the R/C Legend concept, I thought it only right to print their rules for you to go by. Here they are.

R/C LEGENDS RACING RULES

The reasons for Bolink's development of R/C Legend cars, and these rules, is to create inexpensive racing for beginners and experienced racers alike.

The whole idea is to get back to driving skill and care in car setup, *rather than spending lots of money in the latest technology*, the expense of which drives most racers out of R/C racing.

By using a standard low-timing motor and limiting the gear ratio, batteries are much less important (in making your car competitive). Trinity Products has built the motors and battery packs for the R/C Legend cars to try to help create the type of racing that our hobby needs so badly.

We suggest setting up R/C Legend racing with a separate class for beginner drivers. They should be allowed to do hardly anything to change their cars. That way, they will spend their time taking care of their cars and learning how to drive better instead of shopping for motors and batteries to go faster (and hit the wall harder).

We do realize that at certain tracks, gear ratios and tire compounds could be changed to make the cars go faster. However, the most important item to remember is what we're trying to create: a fair and fun class of racing. So, the job of the people who run the races is to keep the R/C Legend cars from becoming all-graphite, ball-bearing, high-dollar racecars.

Keeping the Legend cars stock will give beginners a good, inexpensive place to start (and stay if they wish), or they could learn a lot and then decide to make the jump to the higher-priced equipment and high-tech racing.

BASIC RULES

1. The first rule is that if the rules do not specifically say you can do something, you can not do it.
2. Absolutely no changes to the configuration of the chassis or cutting the chassis parts. No replacement parts of graphite or other high-tech materials.
3. The receiver and speed controller may be installed anywhere on top of the battery plate. Steering servo must stay on front axle plate.
4. No changes in steering geometry, except a bend in the inner links for different-size servos. Double-lock collars allowed on steering links for additional strength. No after-market tie rods or rod ends.
5. No changes in steering blocks, axles, or springs. Shims are allowed on springs to stiffen front ends.

6. Original front bumper must remain on car.
7. No ball bearings allowed anywhere on the car except inside servos. No cutting of the inside of Oilite bushings to reduce friction allowed.
8. No changes allowed to rear axle or differential. No ceramic or carbide diff balls or drive rings allowed. No 64-pitch gears; must use original-type 48-pitch spur gear. No lightweight rear axles.
- 9A. No change in molded rear hubs (no custom-machined hubs).
- 9B. Option: allowed standard (BL-3514) aluminum setscrew hub only.
10. No changes allowed to body trim except for 1/4-inch tolerance around wheels. Body must be painted, and all windows must be clear or cut out.

11. No rollover or stiff-wire antennas allowed. Antenna may be mounted inside on clear plastic mount for small tracks.
- 12A. No variation from original equipment tires in compound listed: blue dot, green dot.
- 12B. Option: for Pro R/C Legend class only, any American-made tire and wheel brand allowed with only green (8515-S) or blue (8534-S) compounds and 1.75- to 1.95-inch-diameter wheels only; 2.6-inch maximum tire diameter. Rear tire width—1.90 to 2.10; front tire width—1.10 to 1.25.
13. Only correctly labeled R/C Legend motors allowed. Label must be intact and legible. Motor may not be taken apart for any reason. Must use original brushes and springs. Option: allowed changes in brushes and springs in Pro R/C Legend class only.

14. Must use correctly labeled R/C Legend 4-cell battery pack. Option: Legend 6-cell pack for Pro class (on large tracks).
15. Must use original pinion and no size change. Option: allow gear change for track size and any brand of 48-pitch production steel gear.

16. DRIVER CLASSES

- A. Charger R/C Legend (for beginners only).** Drivers may be moved up to Semi-Pro Legend class (if dominating class). No rules options.
- B. Semi-Pro R/C Legend.** Any driver with previous experience or moving up from Charger class. No rules options.
- C. Pro R/C Legend.** Drivers wishing to run bearings, other batteries, tires, etc., must go to Pro class. This class is strictly a local option and is not recommended by Bolink.

D. Master R/C Legend. Drivers age 45 and up; same rules as Semi-Pro.

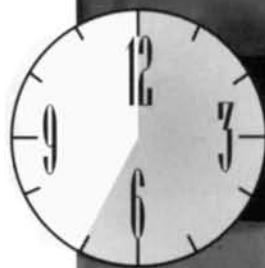
17. Driver figures are required to be run painted and intact (mounted on chassis) in whichever classes desired.

Remember: if the rules do not say you can do it, it is not legal. Also, the more rules that are changed, the more difficult it will become to check the cars, and the farther you will get from the concept we need to get new people and keep them in R/C racing. Bolink's R/C Legend cars are of a simple, strong design to create a class of racing that is inexpensive yet challenging enough for fun racing.

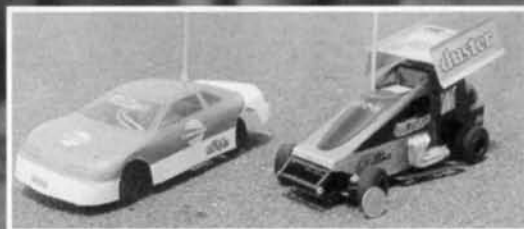
R/C Legend cars, bodies and logos are authorized to Bolink R/C Cars Inc. by 600 Racing, Inc. for their exclusive use in R/C cars and R/C car racing.

[Editor's note: although we agree with the contention that 4-cell cars are easier for rank beginners to drive, we do recognize the reluctance to require the purchase of new packs when most already own 6-cell stick packs. In this case, running 6-cell packs and smaller pinions would seem reasonable. If you do, however, opt for the 4-cell pack, be advised that this could cause some of the less expensive timed chargers to run too hot. We recommend checking with the manufacturer before doing so.]

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.



Hassle-free R/C
35 MINUTES



Oval Outlaws are available with either stock car, oval wedge, or sprint car bodies. Painting is a little tricky because of the smaller size.

BUD'S OVAL OUTLAWS



by TONY DONALDSON

IF YOU READ *R/C Car Action* regularly, I'm sure that you've seen the ads for BRP® Oval Outlaws. I was curious to see how well these cool little cars performed, so I got my hands on two and found out how much fun $\frac{1}{18}$ scale could be.

When you first open the box, the parts look just like those of a $\frac{1}{10}$ -scale model. The clear Lexan body is on top, and all the components are in little bags. But it's so tiny; it's actually a little less than half the size of a $\frac{1}{10}$ -scale model, with far fewer parts.

tiny
tarmac
terrors

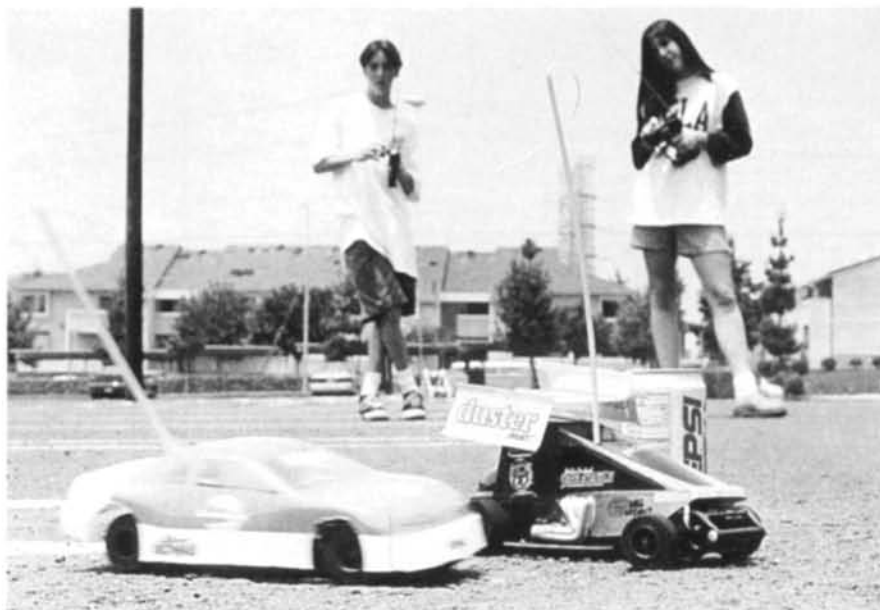
The semi-carefully worded instructions aren't the easiest to follow, but the picture of all the parts (unassembled, but in their proper places) helps quite a bit. A few more diagrams or drawings in the instruction sheet would help those who are R/C-assembly challenged.

Assembling either model takes about 45 minutes, including soldering the resistors and the power wires onto the tiny motor. I used Deans plugs instead of the kit's connectors, and I also put Deans plugs on the wires coming from the speed controllers for added efficiency.

I outfitted each car with the new Novak* Duster ESC, which is based on the 410 M5. The Duster comes with Novak's unique one-touch setup and can use anywhere from four to 10 cells. The Oval Outlaw cars run on four AA batteries, so the Duster is perfect for this application. Make sure that your ESC can run on four cells, and you'll be in business!

The main chassis consists of a molded plastic bottom piece and two side rails; this forms the "tub" in which the electrics are held. In the oval and sprint car, you must mount everything inside the tub because the body rests against the side rails. With the stock body, you have room to mount the ESC and/or the receiver outside the side rails.

Keeping everything inside the tub is tough, because you have to fit the 4-cell battery pack, the receiver, the ESC and the steering servo in an area that's 7x1⁵/₈ inches. Can you say "tight squeeze"? Using a small receiver and servo makes things fit a



that can charge eight at once—enough for almost an hour of run time. After you've charged the cells, get a 4-cell battery holder from Radio Shack or Futaba* (the type that holds two on top and two below), and solder on a Tamiya* connector.

DETAILS

If you think masking and painting 1/10-scale cars is tough, try 1/18! What a fun challenge! Finding decals is tough, too, because most of them look huge. I had to use the smallest Car Action decals available to avoid wrapping the cars in them.

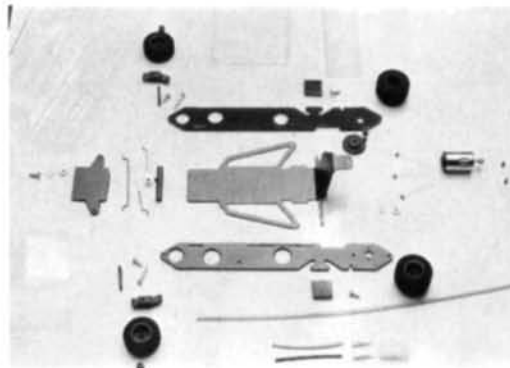
Check with Autographics

of California* for some decals for these small bodies; if anyone has them, they should.

Screw mounts that hold the body on are provided with the kit, but I used adhesive hook-and-loop fasteners. The mounting area where the body rests is ample and quite well-suited to this. I did it for aesthetic reasons—not really for quick access. With these cars' long run times, you don't have to worry about taking the body off a lot.

The sprint is a little more complicated than the stock car; all the pipes and the wings must be attached to the main body. The instructions for the wedge are pretty simple, and plenty of servo tape is provided.

After hooking up the connectors, testing the servo (steering-linkage setup is easy) and zip-tying all the wires, I put on the bodies and took the cars out for a spin.



The parts count of an Oval Outlaw is far less than that of most R/C cars. Anyone who has some R/C experience will be able to put it together in no time.

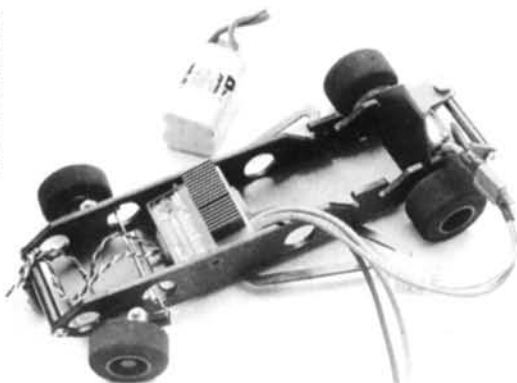
Some friends and I set up a track with some soda cans as markers; BRP makes their own reflective track markers that come six to a package.

The cars were very evenly matched, so skill was the absolute deciding factor. They were a *blast*! They run forever on the 4-cell battery pack (the manufacturer's claim of 25 minutes is just about right). As for speed, they run at about the same speed as a fast walk—not exactly high performance—but they're a ton of fun.

For those interested, performance upgrades include new tires (in various compounds), an assembled 4-cell pack and a ball differential (very trick and easy to assemble). With the ball differential, steering is much more responsive.

If you want a cool little car that's fun to run, easy to set up and that you can take anywhere, then check these Oval Outlaws out!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.



It's a little tight, but you can mount everything on the chassis. The 4-cell AA drive pack will provide about 25 minutes of run time on a charge.

little more easily.

BRP offers a really nice, assembled, 4-cell pack, but to juice it up, you'll need a variable-rate charger that's capable of a 2A charge rate. If you don't have one, you can use loose rechargeable AA cells and any basic AA charger. Some chargers take only three hours; others take 12. I have a charger



Hassle-free R/C
5 MINUTES



Tamiya Quick Drives and Nikko Rides



GET INTO R/C CARS— QUICKLY AND EASILY

by JOHN HOWELL



I'VE HEARD THE question many times: "How did you first get started in R/C?" I started way back in '85, and my first car was a Tamiya Frog. I had never seen or heard of an R/C car race; I was just into bashing around in the dirt or on the street in front of my house, and I had a blast! It wasn't until I had been in the hobby for a while that I started to get into the more high-tech machinery. Since I entered R/C, the emphasis has shifted toward high-end racing equipment, and sometimes it seems as if beginners' needs aren't exactly met. So what's out there for a person who has never picked

up a radio, let alone knows what one is? Well, Tamiya and Nikko have produced lineups of R/C cars and trucks that are perfectly suited to the greenest novice. Let's take a look at what they have.

TAMIYA'S QDS

Tamiya has seen the need for R/C cars and trucks that are easy to build and drive, and they have met that demand with their Quick Drive lineup. Tamiya's QD vehicles are made for people who want to get into the



Take a short cut—ask for advice at your local hobby shop; they'll help you make decisions according to your interests.

hobby but haven't had any experience with R/C cars. The 1/12- and 1/14-scale cars and trucks come built and painted, and the kits come with



radios—all at a relatively inexpensive price. Not a bad deal, huh?

We received a shipment of five off-road QD trucks: a Jeep Wrangler, a Blackfoot, a Monster Beetle, a Clod Buster and a Midnight Pumpkin (Tamiya has fashioned a few of their QDs after their 1/10-scale versions). We

timed ourselves to see how long it would take to get the trucks up and running; the fastest time was roughly three minutes. Think about it; how many hours does it usually take you to build

a kit? The Tamiya QDs' best feature is that they're up and running in a matter of minutes.

Yeah, but are they toys? No way, man. Although they might not be as fast or as able to handle the rigors of brutal off-road conditions as other race-bred R/C cars, the Tamiya QDs are tough customers.

The QD chassis is an ABS-plastic enclosed tub that uses a coil-spring suspension. Each has a built-in electronic speed controller and a 380 Mabuchi motor. A sealed gearbox



PHOTOS BY WALTER SIDAS

houses a reliable gear differential and a high (turbo-drive) and a low (normal-drive) power-selector switch. The low gear is for running on rough surfaces and gives you a little more run time, and the high gear is good for smooth

surfaces (but you sacrifice a little run time).

SO WHAT DO I NEED TO RUN IT?

When you get the kit, just pop either charged Ni-Cds or alkaline AAs into the vehicle, put a 9V bat-

tery in your transmitter, and toss the body on. That's it! You're ready to hit the road. You don't need any tools whatsoever. I suggest that you get a set of rechargeable AA Ni-Cds so you don't have to keep replacing those

expensive alkalines.

HOW DO THEY DRIVE?

They're a little bouncy, and not extremely fast, but after running them a few times, I'd say that they're a blast. John Huber, Karen Jeffcoat,



Chris Chianelli and I took a few of them out onto our parking lot and had an impromptu grudge-match-type race. We were poppin'

Hop-Up Options

If you plan to soup up one of these cars with lots of after-market parts, you're going to have a tough time. Because they all come assembled, there aren't a lot of options from which to choose, and trying to fit parts from other cars will be difficult. You might be able to stuff a really mild modified motor or an after-market stock motor in one of the cars, but you risk destroying the vehicle's built-in speed controller. The servo, the speed controller and the receiver are integrated in these kits, so there's no way to replace one damaged item. When the steering servo goes, so does everything else. Our recommendation: leave the electronics alone! Here are a few things you might want to try, though.

■ Tamiya QDs

Tamiya offers some options for the QD cars, such as a QD Black Motor and CVA shocks, but that's about it. The Black Motor would be a good choice for increased speed, and because it was designed for the QD cars, it won't give the electronics any trouble. The CVA shocks will help keep bouncing to a minimum and will make the car much easier to drive. Any good hobby shop should be able to order the hop-up parts you want, as well as any replacement parts.

■ Nikko R/Cs

The Nikko trucks, such as the Gladiator and Thor, look as if they should accept the monster-truck tires found in hobby shops, but you'll have to use the stock rims. The bolt pattern on these rims isn't like any other car we've seen, so you won't find much out there to replace them. If you need new rims, they can be ordered from Nikko with the supplied order form and parts list. The shocks on the trucks could easily be replaced with oil-filled units for better performance. You can add anything from Tamiya plastic oil-filled shocks to aluminum Associated shocks with little modification.

—by John Huber



Battery Basics

After you've picked out the car you want, you have to choose your power system. Some of the Tamiya QD cars come with rechargeable nicad batteries (Ni-Cds), and others require dry cells (standard batteries). We tested vehicles with Ni-Cds and alkaline AA cells. The alkalines provided good run times, but the Ni-Cds had much more punch. Pegging the throttle when the vehicle with Ni-Cds was rolling backward slightly was all it took to get the front wheels off the ground. With the alkalines, the speed was about the same, but the punch just wasn't there. Run time with the Ni-Cds was about 20 minutes; with the alkalines, it was about 15.



Nikko sells a battery/quick-charger combo that will get any of their 9.6V vehicles up and running. It includes a high-quality assembled pack with a four-hour charger. Unlike Tamiya vehicles, all Nikko cars run on Ni-Cds. This is good because you won't have to spend money on throwaway batteries, but you will have to wait for the packs to charge before you can run. If you give one of these cars as a present, charge the battery beforehand!

The bottom line: Ni-Cds are better for R/C vehicles. The added power is well worth the wait to charge them. For maximum fun, get an extra battery pack so you can charge one while you run the other.

—by John Huber



Left column top to bottom:
Tamiya Monster Beetle QD
Tamiya Midnight Pumpkin QD
Nikko Brat
Tamiya Jeep Wrangler QD
Tamiya Clod Buster QD

Above top to bottom:
Nikko Porsche 959
Nikko Thor
Nikko Gladiator
Tamiya Blackfoot QD

wheelies and driving all over the lot when we started a smash-up derby—what a blast! We had so much fun playing “tag, you’re it” that we didn’t want to go back inside. The trucks have a run time of about 20 minutes with a set of Ni-Cds and about 15 minutes with a set of regular alkaline batteries.

NIKKO R/Cs

OK, *these* must be toys, right? Not necessarily. They’re definitely a step above toy-grade quality. And they’re brutally tough. We tested the Porsche 959, the Thor, the Brat and the Gladiator.

All are powered by stock 540s, and all use Ni-Cds. The Brat uses a 9.6V, 8-cell AA rechargeable pack; the others use basic 6-cell packs. Reliable gear diffs provide smooth acceleration, and we found that each unit’s steering was very responsive. Each car and truck comes with a bumper (or bumpers) that soak up major impacts. When testing the Porsche, I took it out behind our building and slammed it into a stone wall repeatedly at full throttle—forward and backward—at least 100 times! Guess what?—only slight



scratches on both bumpers. I did the same with the other vehicles and got the same results. If you

happen to break one of these cars under normal use, you will then be named the “King of Crash.”

Of the cars we tested, the Porsche 959 and the Thor pick up truck provided the most entertainment. Chris took the Thor out for a cruise, went full throttle and then jammed it into reverse. The sucker endo’d right over—plenty of torque from this bad boy. Once again, not a scratch! Another cool feature of the Thor is that its headlights turn on when you apply the throttle. (The Porsche has this feature, too.) Although none of these vehicles will break any land speed records, they have enough “get up and go” to have some fun. The 2WD buggy—the Brat—comes with a gear-selector switch on the tranny that lets you run it in high or low gear. Of the Nikkos we tested, the Brat was definitely the fastest.

WOULD I BUY ONE?

Not necessarily, but then again, I’m not exactly a beginner. I *did* have a blast driving each and every one of them, though. So, if you know someone who has never picked up a radio and wants to get into R/C, the Tamiya QDs and Nikko R/Cs are perfect for them. Check ‘em out! They’re rugged and should provide hours and hours of reliable R/C fun. Get someone you know into R/C today!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

Do's and Don'ts

Here are a few valuable do's and don'ts when it comes to running your Nikko R/Cs and Tamiya QDs!

- Always turn on the transmitter before you turn on the car.
- After every run, let the battery pack cool down before you charge it again.
- When you've finished, always disconnect the batteries and remove them.

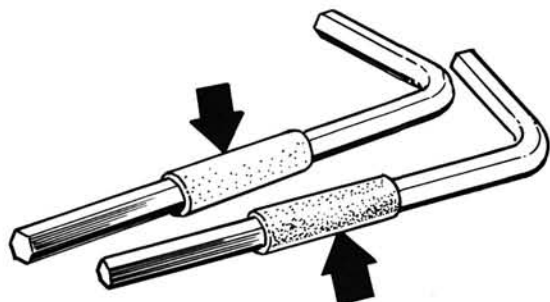


- Never run through puddles or tall grass.
- Don't run where you could cause an accident with a full-size car.
- Don't go swimming for at least a half hour after eating.
- Clean off dirt and mud with a small bristle brush.

—by John Huber

PIT TIPS

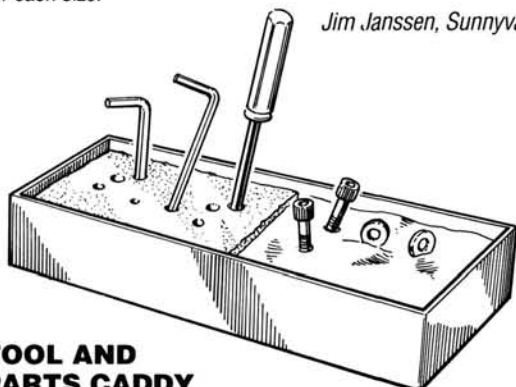
JIM NEWMAN



KEY IDENTITY

Identify your keys with heat-shrink tubing—one color for metric and another for standard sizes. You can also use a different color for each size.

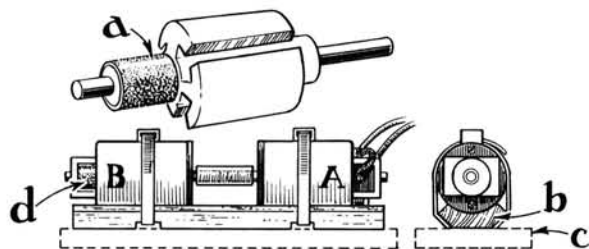
Jim Janssen, Sunnyvale, CA



TOOL AND PARTS CADDY

Keep small tools and parts in this tool caddy made out of an old checkbook box that has modeling clay in one half and insulating foam in the other. During a pit stop, when every second counts, you'll quickly be able to pick out the keys, nuts, screws, etc., you need.

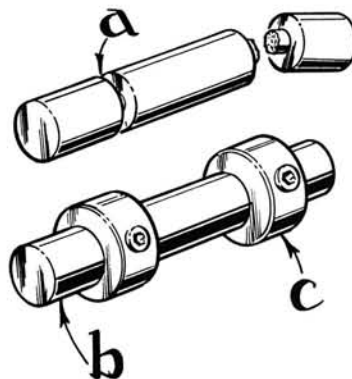
Brian Prentice, Terri, IA



BRUSH GRINDER

Strip the armature off an old motor (B), remove the commutator and glue a 1/4-inch (6mm) sanding drum (a) in its place. Reassemble the motor and use rubber tubing to couple its shaft to a working motor (A). Then strap the assembly to a piece of wood molding (b) with cable ties. The brushes to be ground go in the brush holder (d) of the old motor (B). Glue the assembly to a base (c).

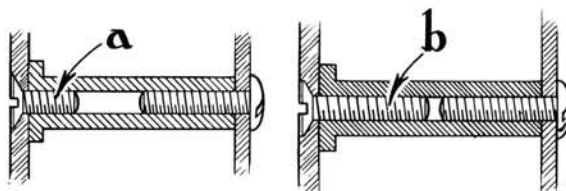
Dave Cooper, San Diego, CA



STRONGER LOSI PIVOTS

In a crash, Losi rear-hub carrier pivots often snap at the E-clip groove (a). Strengthen them by cutting a hinge pin (b) with a Dremel grinder and then adding plane wheel collars (c).

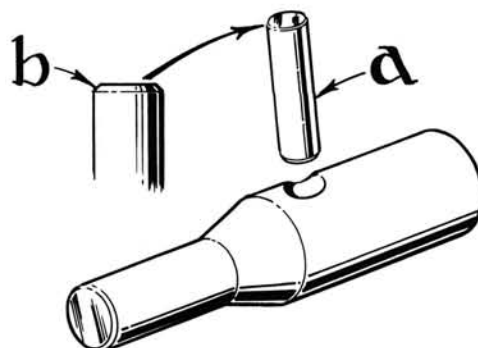
Steven Dong, Staten Island, NY



NON-STRIP TRIUMPH/ULTIMA POSTS

Remove the M3x6 flat-head screws (a), then slightly shorten M3x12 flat-head screws and put them in their place (b). The longer threaded part prevents the posts from being stripped out.

Steven Hicox, Richmond Hill, GA

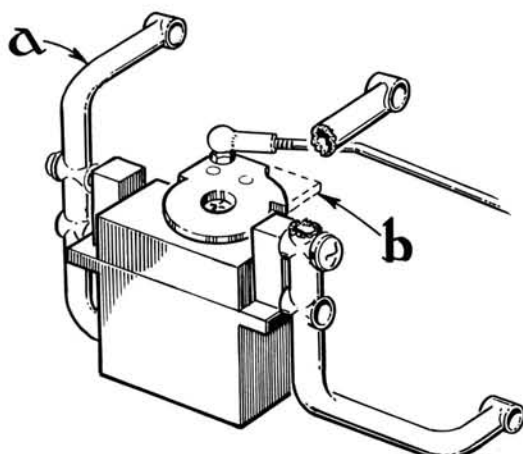


RC10 REPLACEMENT ROLL PIN

If you lose a roll pin (a), make a new one by snipping off a piece of coat-hanger wire and filing a slight bevel (b) on one end to make it easier to insert.

Bryan Moss, Frenchtown, MT

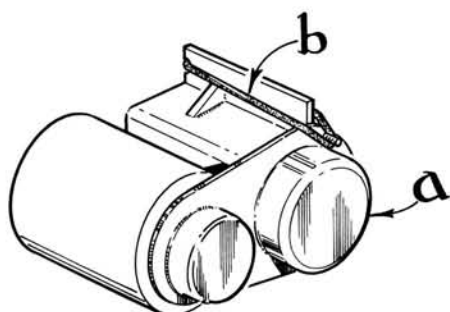
PLEASE NOTE: be sure to print your name and full address clearly on every letter and sketch you send to "Pit Tips." We can't publish many good tips because we don't have the senders' names or addresses.



CLOD BUSTER SERVO POSITION

To minimize bump-steer in kits with long travel, mount the steering servo between the twin tube bumper (a). File away a corner of the servo-saver (b), and bend the steering rod to allow clearance.

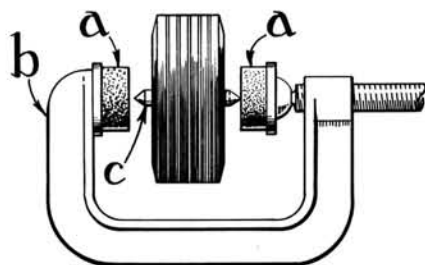
Edward Gard, Mesquite, TX



LOSI GEAR COVER

Secure the gear cover (a) with a rubber band (b) hooked around the body-post stands. You'll be able to remove and replace the cover quickly.

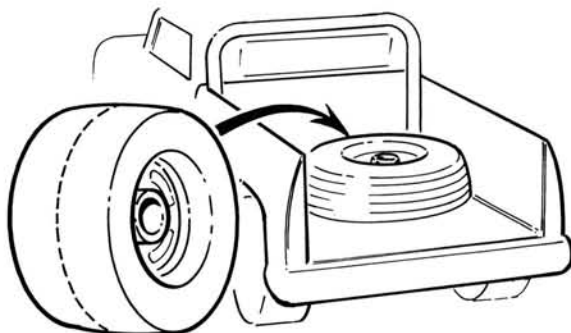
Kevin Ng, Austin, TX



MAGNETIC TIRE BALANCER

This works like the Top Flite balancer. Glue magnets (a) to the pads of a C-clamp (b). Fit the wheel/tire combination on a metal hand-held balancer (c), then set one end of the balancer against one magnet. Make the gap between the other end of the balancer and the other magnet as small as possible. Hold the C-clamp level in a vise. The heavy side of the wheel will fall to the bottom.

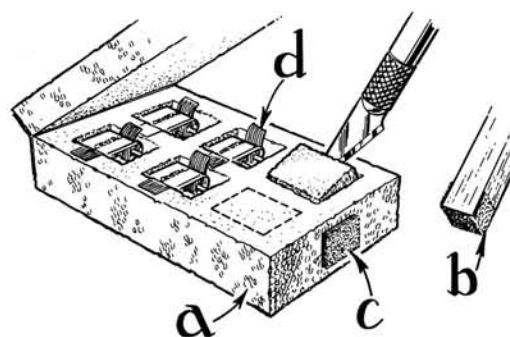
Joe Cox, Oskaloosa, IA



SPARE WHEEL

If you're customizing your R/C truck, split an old wheel and tire, then glue them into the bed of the truck as a "spare."

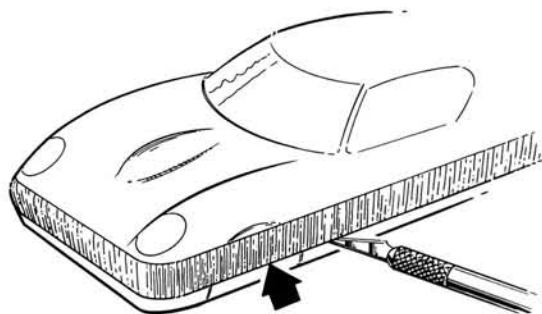
Hector Fuentes, San Ysidro, CA



CRYSTAL CARRY CASE

Make a carry case for those fragile crystals. Cut recesses in a block of foam (a), clean them out with sandpaper on a stick (b). Glue tape across the recesses, then press the crystals into the recesses and onto the tape. Make a foam lid that can be hinged with tape and secured with a Velcro®-brand fastener patch (c) and strap.

Abhay Dalal, Jackson Heights, NY

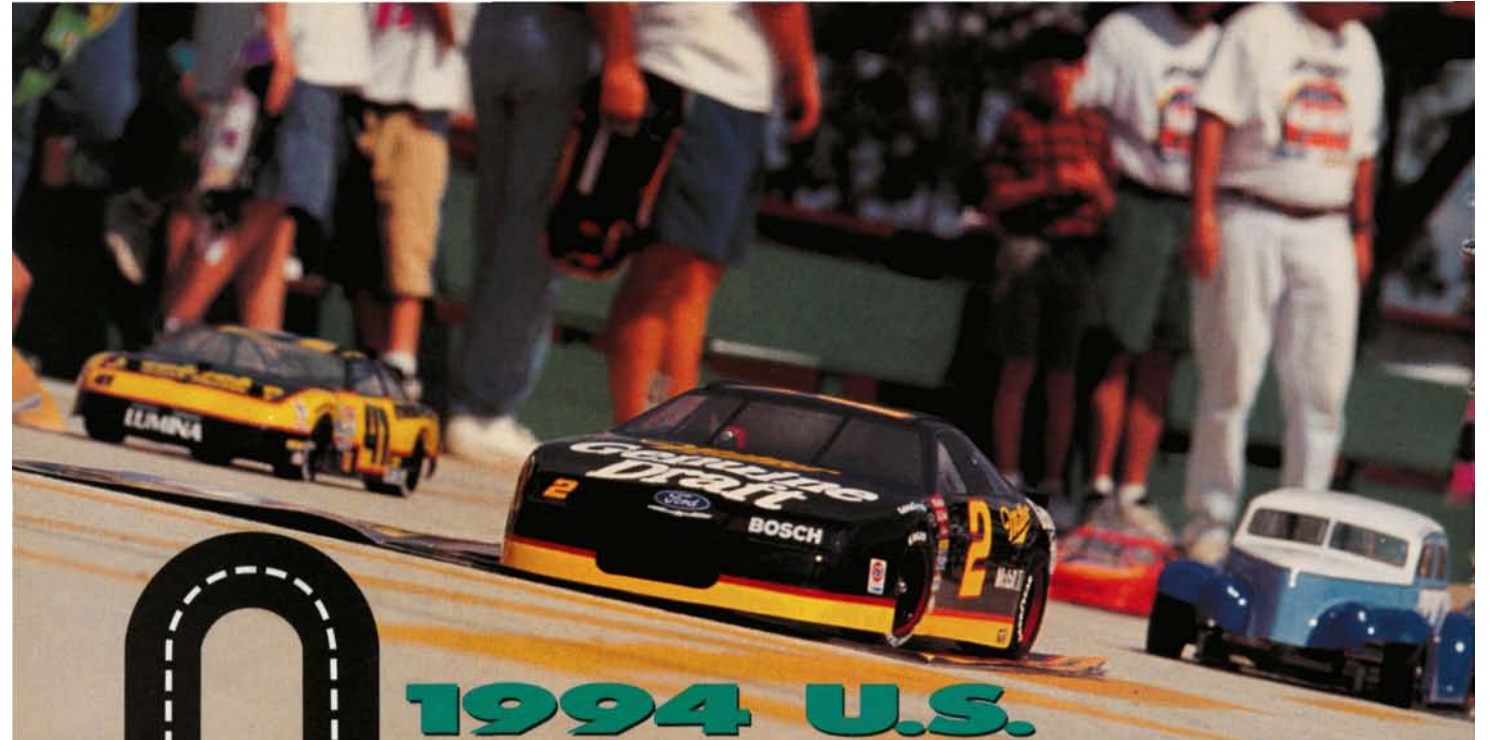


STRAIGHT TRIMMING

This beats trying to hold a straightedge! Mark the trimming line, then put masking tape along it, making sure the tape is straight. Then, for a really straight cut, run your knife along the tape.

Jason Lopez, West Hills, CA

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



1994 U.S.



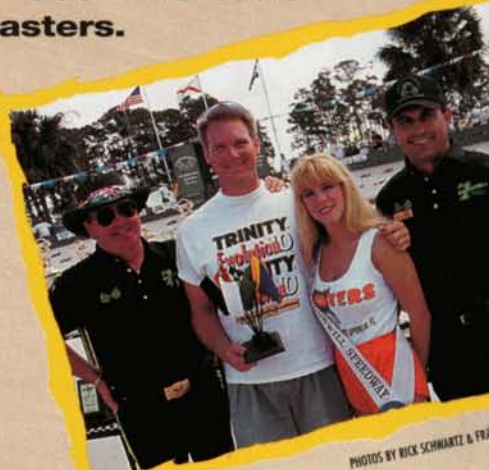
VAL MASTERS

by RICK SCHWARTZ



TAKE THE BEST oval drivers in the world, add some pretty good amateurs, six racing events, the pomp and circumstance of Lake Whippoorwill Speedway and a little controversy, and you end up with the year's hottest race—the 1994 Oval Masters.

Ova



PHOTOS BY RICK SCHWARTZ & PHIL

Held during the first weekend in April in Orlando, FL, the event saw oval racing at its best. The racers were divided into two basic groups: the invitational drivers and the amateurs. The invitational drivers were the top names in the sport and competed in the Trinity Challenge, the Bolink Clash, the TRC Dash and the Novak 500. The amateurs could enter the same events, except the Novak 500, and they competed against drivers of similar skill. The Novak 200 allowed the amateurs to compete in an enduro event.

FINE-TUNING FOR THE FINALS

Qualifying started on Friday, and there were three chances to make the A-Main. For the 500-lap and 200-lap enduro races, 125 qualifiers were held. The enduro cars were specially designed for the quick-change battery systems. To set up a car to run for 20 or 50 minutes takes a lot of skill and patience.

When the qualifying was over on Saturday evening, the Mains were set for the five finals on Sunday. The TQs, and winners of the Bolink Clash, were Mike Boylan, Novak 500; Kevin Lanier, Novak 200; Joel Johnson, Trinity Challenge Invitational; Craig Evraets, Trinity Challenge Amateur Modified; and Jason Alderman, Trinity Challenge Amateur Stock.

RARING TO GO

Sunday's action began with all the tradition surrounding Lake Whippoorwill. Bob Hosch, who was turning over the track to new owner Jim Vaughn, had planned a gala celebration. The national anthem, awards for sponsors, a concours competition, a parade of cars, a full-size NASCAR racer on display and magnificent trophies were all part of his farewell event.

Sunday's first competition was the TRC Dash. This was a 2-minute, single-elimination, head-to-head race for a camcorder supplied by Tim Morton of TRC. When the smoke cleared, Jim Dieter, who designs and races cars for Trinity, walked away number one, with a blistering 24 laps in 2:02.4.

In the A-Mains of the 4-minute Trinity Challenge races, the competition was hot and heavy. No second chances here! Amateur Stock was won by TQ Jason Alderman, with 41 laps in 4:00.37. Paul Schaub chased him all the way and finished second in 4:02.9. Alderman pulled a double in Amateur Mod and edged out TQ Craig Evraets. With 46 laps in 4:04.61, Dieter walked away with a second trophy, nosing out pit mate and TQ Joel Johnson in the Invitational Class by less than 1 second.

ROUND AND ROUND WE GO

This is where the fun began. The enduros were getting under way. As the

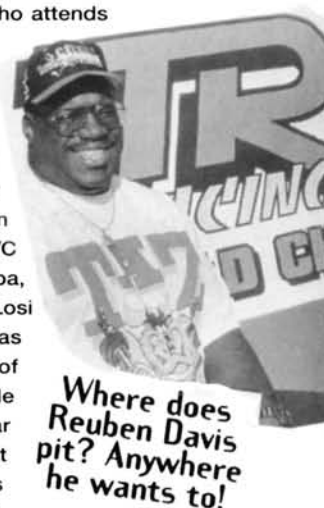
TACKLING THE OVAL

Reuben Davis, an NFL defensive tackle, is an avid R/C racer who attends as many events

as he can. After attending the University of North Carolina, he played for the Tampa Bay Buccaneers for seven years. He got into R/C car racing in Tampa, starting out with a Losi JRX-T, and he has raced every type of vehicle available. He thinks that R/C car racing is a hobby that people of "all ages can compete in," and that it's a great outlet for stress.

Reuben loves the camaraderie, and R/C has allowed him to help others participate. He even rented a block of rooms at an Orlando hotel for racers who couldn't afford to make the trip to the Masters. Unfortunately for the Tampa racing fraternity, Reuben used his free agency and is now a San Diego Charger. At least he went to another hotbed of R/C racing. Maybe that was part of his contract negotiations. All the racers who know Reuben agree on one thing: he's got a heart of gold.

Good luck in San Diego, Reuben. Keep on racing!



Enduro Extreme

THE NEW ON THE BLOCK

One of the greatest things about attending a lot of races is seeing the success of new companies that are entering the R/C manufacturing arena. Everyone has his old favorites, and new products aren't always accepted easily. In this sport,

though, one thing always holds true: if it wins, people will try it. Fortunately for Dale Epp of Protoform Race Bodies, a lot of racers are trying his product. He's winning!

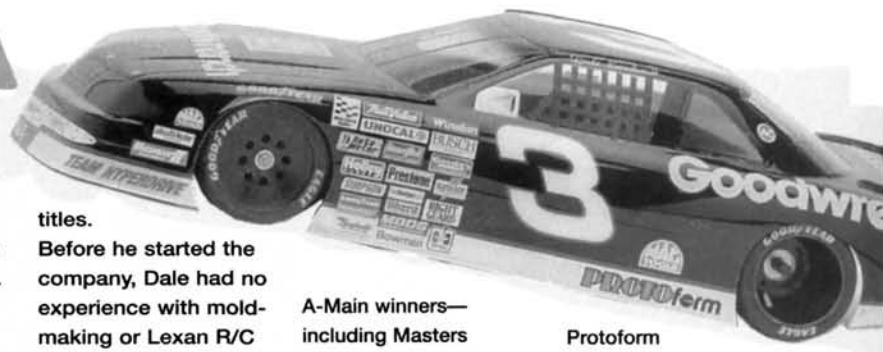
Although only two years old, Protoform has come on strong and taken some major

titles.

Before he started the company, Dale had no experience with mold-making or Lexan R/C bodies—just a lifelong love affair with cars, racing, aerodynamics and design. At this year's Masters, four out of the five TQs and four of the five

A-Main winners—including Masters champ Mike Boylan—ran Protoform bodies. Dale continually works to improve his product, and he uses racer feedback in his hunt for the perfect R/C body.

Protoform also makes bodies for all the other classes of racing. Welcome to the manufacturers' winners' circle, Dale!



1994 U.S. OVAL MASTERS RESULTS



NOVAK 200

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Body	Tires
1	2	Chuck Massey	Associated	Fantom	Sanyo	Novak	Protoform	BSR
2	10	Paul Schaub	EV10SS	Cam	Sanyo	Tekin	Protoform	TRC
3	8	Joby Uchtman	Associated	Fantom/Reedy	ESP	Tekin	Associated	BSR
4	1	Kevin Lanier	Bolink	East Coast	Smooth	Tekin	Bolink	N/A
5	4	Craig Evraets	Trinity	Trinity	Sanyo	Tekin	Protoform	TRC
6	7	Chris Brimmer	Associated	Fantom	N/A	Tekin	Protoform	TRC
7	5	Mike Koon	Associated	Bad Boy	Sanyo	Novak	Protoform	BSR
8	9	Phil Asseff	Hyperdrive STX	Cam	Sanyo	Tekin	Protoform	TRC
9	6	Jeremy Kornblatt	Associated	Twister	Double Strike	Novak	Protoform	TRC
10	3	Vicky Carrubba	Associated	Buds/BRP	Sanyo	Novak	Bolink	TRC

NOVAK 500

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Body	Tires
1	1	Mike Boylan	EV10SS	Trinity	Trinity	Novak	Protoform	TRC
2	2	David Davis	10LSS	Fantom	Ballistic	Novak	Protoform	TRC
3	6	Tim Lanier	Bolink	East Coast	Sanyo/Smooth	Tekin	Bolink	TRC
4	5	Rob Cutman	Associated 10L	East Coast	Hot Shot	Novak	Bolink	TRC
5	9	Dave Hechler	Associated	East Coast	Sanyo	Novak	Bolink	TRC
6	3	Ralph Burch	Hyperdrive	Cam	PTI	Tekin	Protoform	TRC
7	8	Ricky Jordan	Bolink	East Coast	Voodoo	Tekin	Bolink	TRC
8	4	Chris Smith	Bolink 10L	Cam	Cam	Novak	Bolink	TRC
9	10	Mike Mitzel	Hyperdrive	Cam	Cam	Tekin	Bolink	TRC
10	7	Jim Fuller	EV10SS	Trinity	Sanyo	Novak	Bolink	TRC

TRINITY CHALLENGE INVITATIONAL MODIFIED

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Body	Tires
1	2	Jim Dieter	EV10SS	Trinity	Trinity	Novak	Bolink	TRC
2	1	Joel Johnson	EV10SS	Trinity	Trinity	Novak	Bolink	TRC
3	4	Tony Neisenger	Trinity	Fantom	Hot Shot	Tekin	Bolink	TRC
4	6	Chris Doseck	EV10SS	Trinity	Trinity	Tekin	Protoform	TRC
5	3	Mike Boylan	Trinity	Trinity	Trinity	Novak	Protoform	TRC
6	9	David Davis	10LSS	Fantom	Ballistic	Novak	Protoform	TRC
7	8	Chris Smith	N/A	Cam	N/A	Novak	Bolink	TRC
8	10	Bobby Horan	10LSS	Reedy	PTI	Novak	Protoform	TRC
9	5	Bud Bartos	Associated	BRP	Power Push	Novak	Bolink	BSR
10	7	Mike Blackstock	Trinity	Trinity	Trinity	Novak	Bolink	TRC

TRINITY CHALLENGE AMATEUR STOCK

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Body	Tires
1	1	Jason Alderman	Associated	Trinity handout	Cannon GRP	Tekin	Protoform	TRC
2	2	Paul Schaub	Trinity EV10L	Trinity handout	Sanyo	Tekin	Protoform	TRC
3	7	Bob Astarita	10L	Trinity handout	Sanyo	Novak	Protoform	TRC
4	5	Greg Hensley	Associated	Trinity handout	Sanyo	Tekin	Protoform	TRC
5	10	Howard Baird	10L	Trinity handout	Sanyo	Tekin	Bolink	BSR
6	6	Kevin Mandeville	Trinity	Trinity handout	Trinity	Tekin	Protoform	TRC
7	4	John Grubb	Associated	Trinity handout	Sanyo	Novak	Protoform	TRC
8	9	Mike Ivanics	Associated	Trinity handout	Sanyo	Tekin	Protoform	TRC
9	8	Billy Bruce	Composite Craft	Trinity handout	Sanyo	Novak	Protoform	TRC
10	3	Larry Burkett	HPI 10LSS	Trinity handout	Voodoo	Tekin	Sanyo	TRC

TRINITY CHALLENGE AMATEUR MODIFIED

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Body	Tires
1	3	Jason Alderman	Associated	Litespeed	Cannon GRP	Tekin	Protoform	TRC
2	1	Craig Evraets	Trinity	Trinity	Trinity	Tekin	Protoform	TRC
3	2	Glenn Kaeser	Cobra	Cobra	Team Smooth	Tekin	Bolink	TRC
4	9	Bob Fairbrother	Composite Craft	Trinity	Sanyo	Novak	Protoform	TRC
5	4	Paul Schaub	Trinity EV10L	Cam	Sanyo	Tekin	Protoform	TRC
6	10	Jeremy Kornblatt	Associated	Twister	Double Strike	Novak	Protoform	TRC
7	6	Brethe Hoover	Associated	Fantom	Sanyo	Tekin	Protoform	TRC
8	8	Jamie Tennes	Trinity	Trinity	Ballistic	Novak	Protoform	TRC
9	7	Joe Renella	Trinity	Trinity	Trinity	Tekin	Protoform	TRC
10	5	Larry Flowe	Hyperdrive	Cam	Sanyo	Tekin	Protoform	TRC

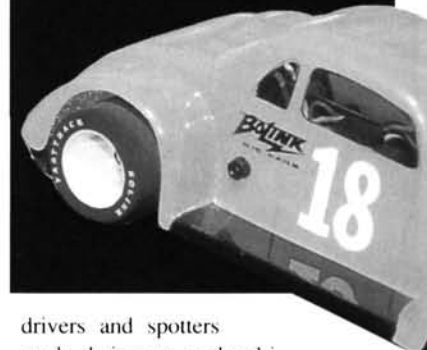
I DON'T THINK WE'RE IN KANSAS ANYMORE!

The one thing that was lacking at the "Whip" this year was a program. When I got there, I thought I would be covering one event—the 1994 Oval Masters. Little did I know that six separate titles were to be decided. For the uninitiated, I'll try to make it as simple as possible.

The first race was the Trinity Challenge(s), which followed a 4-minute format. Three champions were to be decided in the Amateur Class (Stock and Modified) and the Invitational Class (Modified). The other races were the Novak 200, for amateurs, and the Novak 500, which is by invitation only; the winner of the Novak 500 is declared the 1994 Oval Masters champion. But we're not finished yet. The TQs in the qualifiers for those five races were named champions of the Bolink Clash.

Finally, we had the TRC Dash. These were 2-minute, single-elimination, head-to-head runs by the top four qualifiers of the Novak 500, the TQ of the Amateur Trinity Challenge and the top five qualifiers of the Invitational Trinity Challenge. The prize, won by Jim Dieter, was a new camcorder, supplied by Tim Morton of TRC.

Although all this was confusing at first, as the weekend progressed, I understood what was going on. I thank Yvonne Hosch for explaining it to me five times!



drivers and spotters made their way to the drivers' stand and the pit crews moved into the pit lane, the spectators settled down to wait for the green flag.

• **Novak 200.** This first race eliminated drivers one by one; the longer they raced, the greater were the chances that they would make mistakes, their cars would crash and their parts would

New IN THE PITS



NEW AND IMPROVED

From Bud Bartos and BRP Racing Products comes a completely new front end. The top arm is set up with studs (instead of rod end balls) in the top plate that can be shimmed to adjust caster and camber. The two top links allow you to adjust camber and caster settings. New notched kingpins will have a bottom spring pocket with a setscrew collar to lock them in; this will reduce scratching abrasion and make the front end very rigid. The front end is available for all Associated cars and all cars that use Associated bottom arms.

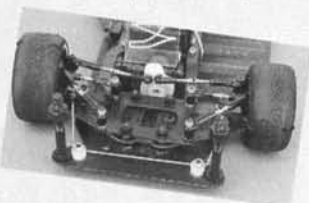
BRP Model Racing Products, 1575 Lowell St., Elyria, OH 44035; (216) 284-0270.



OUTRAGEOUS OVAL OUTLAW

Another new item from BRP is the 1/18-scale Oval Outlaw. Small, but tough, this car uses four AA Ni-Cds and will run for 20 to 25 minutes on one charge. It uses standard radio equipment and comes with a powerful mini-motor, mounted and trued tires and either a stock car, a wedge, or a sprint car body. It can run anywhere; in fact, racers were

dodging these cars all weekend in the pits. The Outlaws are a blast to drive and allow you to race anywhere—anytime.



BOLINK NEWS

Another new front end comes from Bolink R/C Cars. According to Bolink's Rick Jordan, it's different from existing designs in that its steering block doesn't move up and down on the kingpin; instead, its upper and lower control arms move. The preset caster and camber are adjustable, as is the amount of caster and camber change as the upper and lower arms are depressed. You can adjust the ride height by putting spacers above and below the steering blocks. The A-arms are mounted in rubber to protect them from breakage. The new kit can be used for the Bolink LTO Pro, the Associated 10L, the Trinity EV10 and the Hyperdrive. **Bolink R/C Cars**, 420 Hosea Rd., Lawrenceville, GA 30245; (404) 963-0252.

LONG-LASTING RELIEF!

Although not designed as an endurance racing tire, BSR Racing Tires' new FeatherLite Pro took first-place honors in the Novak 200. According to owner and designer Ronnie Vines, the new tire and wheel are the lightest in the world and make a durable



combination.

BSR Racing Tires, Rte. 6, Box 54, Killen, AL 35645; (205) 757-1564.



INTO HYPERDRIVE

Hyperdrive's new entry into the oval field is the STX, an improvement over the existing RS. The changes include adding an Associated-style front end to allow more adjustment, moving the batteries back and in to provide more stability, laying the side shocks down for better suspension geometry and using a shortened wheelbase. In addition, the top shock now pivots on the T-plate to provide more stability and rear traction; the motor has been moved to the center of the car; the chassis uses better graphite for more rigidity and less side flex; the car will accept any after-market axle; and *whew!* last, but not least, it will accept left-hand drive.

PTI/Hyperdrive, P.O. Box 950, Pilot Mountain, NC 27041-0950; (919) 368-1375.

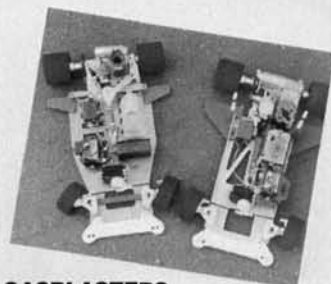


AD-VANTAGE!

Vantage Engineering showed off its new high-performance V410PF electronic speed con-

troller (ESC). According to designers/racers Steve Gilbert and Tom Fatur, their new ESC has virtually no "on" resistance because the FETs it uses are nearly twice as large as those usually used in R/C equipment. This can reduce typical power loss by 33 percent. This ESC also has programmable torque control, a reverse-polarity fuse that can be reset and internal Schottky-diode regeneration.

Vantage Engineering, 681 Main St., Waltham, MA 02154; (617) 894-8694.



GASBLASTERS

TRC's Tim Morton displayed a yet-to-be-named 1/10-scale on-road gas car for oval tracks; it can also be set up to run on road-courses. The basic kit doesn't include a motor, a carb, or a muffler, but it comes with everything else you need to bolt and go. TRC also offers a complete kit that includes everything you need to run the car, except radio equipment; you have a choice between two .12 engines. The car looks really hot and has state-of-the-art technology for an out-of-the-box winner.

Tim also showed off his new gas conversion kit for the Associated 10L wide chassis. This kit is also offered in basic and complete versions.

TRC, P.O. Box 1058, 2211 Charter St., Albemarle, NC 28001; (704) 982-0507.



break. The drivers took longer pit stops, and minor repairs became major ones.

The one driver who had it all together was Chuck Massey, who finished first, winning by 12 laps over Paul Schaub.

• **Novak 500.** This was the final event, and the world's top drivers were ready to race for 500 laps, which would take approximately 50 minutes. Unfortunately, several power outages turned that 50 minutes into almost two

hours. It seems that one of the chargers in the pits kept shorting out and causing the race computer to go down. After several restarts, the final leg of the race ran smoothly and allowed a tired, but excited, TQ Mike Boylan to claim the title of Oval Master for 1994. Dave Davis finished second, and Tim Lanier, a close third.

The only controversy of the entire weekend came at the end of the Novak 500. At the drivers' meeting on the morning of the race, it was noted that if a driver completed another

lap after he had finished the race, he'd be disqualified. That's just what happened to poor Mike Boylan. After the race's finish was called, a stunned Boylan listened to shouts of "Disqualified." Fortunately, the rule wasn't enforced in this case because the drivers hadn't known when the race was over; the power outages had made the scoreboard inaccurate.

Congratulations to all who participated. It was a great event. I can't wait until next year's race!



SCHUMACHER

Storm

by GARTH FINLEY

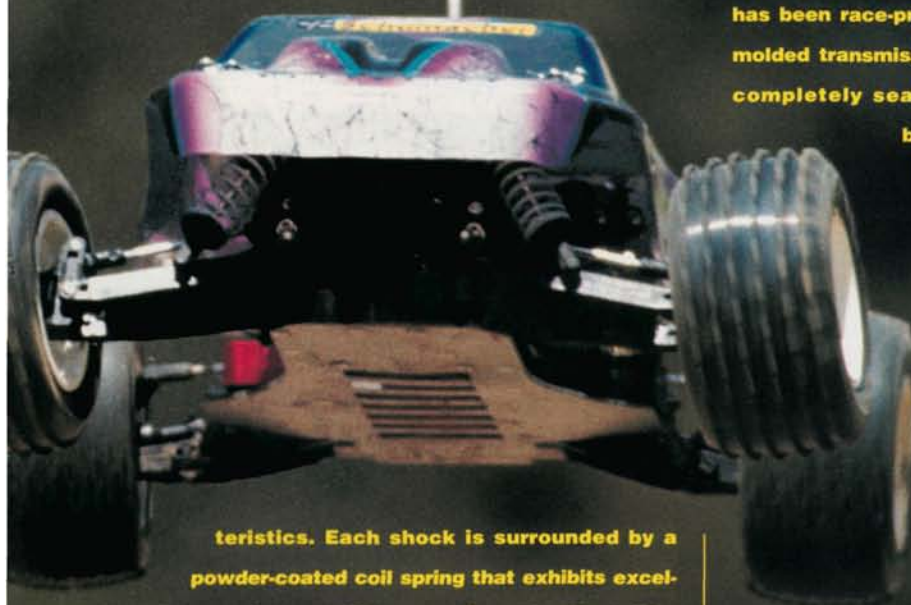
THE NEXT GENERATION of Schumacher* off-road electric vehicles is now joined by the Storm 2000 Stadium Truck. It's a serious competition truck that has all the ingredients necessary for victory. Its bi-level fiberglass chassis configuration provides a high degree of torsional rigidity and a stable platform on which to mount the rest of the major components.

LET'S TALK SHOCKS

The Storm 2000 comes with Schumacher's Pro shock absorbers. All four shocks are extra-long to soak up the worst bumps and extreme landings, and they have volume-compensating, rebuildable cartridges; precision-ground, chrome-plated shafts; and hard-anodized, Teflon-coated shock bodies. The cartridges have a unique closed-cell foam section that compensates for the volume change induced by shock-shaft displacement. This helps to keep the shock body from becoming pressurized as more of the shock shaft enters it. In addition, the shocks have adjustable pistons so that you can alter overall damping without having to change the oil's viscosity. You can build the shocks with your choice of two seals that have different "stiction" and sealing charac-

PHOTOS BY JOHN HOWELL

2000



teristics. Each shock is surrounded by a powder-coated coil spring that exhibits excellent spring consistency. You can adjust the ride height using clip-on molded spacers. In short, these shocks are excellent and have all the bells and whistles needed to be at the top of their class.

TRANSMISSION

The Storm 2000 is Schumacher's first truck that has a gear-driven transmission. It features a 2.0:1 ratio that's

geared with a conventional, 48-pitch gear train. The differential, which is the same as that of the Cougar 2000, has been race-proven for more than a year. The entire molded transmission case and ball differential unit are completely sealed to ensure a long operating life between rebuilds.

The ball-bearing friction clutch—a proven winner since the debut of the Cougar II—is one item that hasn't been changed. The clutch owes its consistent performance to its well-machined, hard-anodized plates and the Teflon disk that's sandwiched between them. The clutch is easy to adjust, and you can change the spur gear without altering the clutch's setting.

The Storm 2000 comes with newly designed coaxial drive shafts. A roller drive-shaft conversion (U1525M) was added during assembly. This inexpensive enhancement lets the drive shaft expand and contract more freely during rear suspension travel. The shafts are lightweight yet bulletproof, exhibit almost no torsional play and rotate extremely true; this results in almost no vibration.



SUSPENSION

Unlike the setup in many previous Schumacher kits, the front bulkhead is fixed at 30 degrees. A rigid, black, fiberglass shock tower is mount-

The only tricky part was inserting the universal joints into the drive shafts—until I figured out how to master the technique outlined in the instructions.

ed on the bulkhead along with a sub-shock tower that serves as a shock-tower stiffener. Both the front shock tower and the lower wishbones allow a variety of shock-mounting positions. Front caster can be quickly adjusted between 0 and 15 degrees by changing small inserts that are press-fit into the caster blocks. The front suspension is completed with rigid front arms, 5-40 threaded turnbuckles and Schumacher's ball cups.

The steering servo and the rack system are neatly housed between the upper and lower chassis plates. The steering servo is mounted transversely to allow adequate room for its adjustable, spring-

The batteries rest lower in the chassis, thanks to the slots in the bottom. Don't worry about the slots affecting stiffness; a beefy upper brace keeps things ultra stiff.

loaded, servo-saving system. Ackerman is adjusted by changing the link that connects the two bellcranks.

The rear suspension also consists of a lower wishbone/upper control-link configuration. The long rear wishbones are mounted very closely together at their inner hinge pins and extend partially into the wheels, where they're pinned to a hub carrier. As in the front, the rear wishbones, the shock tower and the upper control-link mounts offer a variety of adjustments. Anti-squat is controlled at the inner hinge pins, and rear toe is adjusted by changing the inserts that are press-fit into the hub carriers.

ASSEMBLY

This baby went together easily. The only tricky part was inserting the universal joints into the drive shafts—until I figured out how to master the technique outlined in the instructions. Heat the female drive shaft moldings in hot water right before you insert the universal joints; this temporarily softens the plastic and makes the job much easier. Also, use the right tool for each job. I strongly recommend

As you can see from this overhead view, there is ample room on the chassis for the electronics.



Schumacher Storm 2000 Stadium Truck

Scale 1/10
Type 2WD stadium truck
Price \$399.95

DIMENSIONS

Width 12.25 in.
Wheelbase 11.3 in.

WEIGHT

Gross (w/battery)63 oz.

BODY

Type Stadium truck
Material Polycarbonate

CHASSIS

Type Bi-level boxed
Material Fiberglass

DRIVE TRAIN

Primary Pinion/spur
Transmission Gear drive (2:1)
Differential Externally adjustable ball
Bearings/bushing Bearings



WHEELS

F/R: Type One-piece molded plastic
Dimensions 2.2x2 in.

TIRES

Front Staggered rib
Rear Mini-pin

ELECTRICS

Motor/battery/speed controller Not included

HITS

- Shock absorbers • Transmission and differential • Coaxial drive shafts • Durability and rigid construction • Easy to construct • Excellent moldings

MISSES

- Price tag a bit steep • Shock towers and body mounts too bulky • Too many adjustments for inexperienced modelers



STORM 2000

that you purchase a no. 1 tip Posi-Drive screwdriver and a 5.5mm nut driver to accommodate all the fasteners. Schumacher USA offers these tools (made by Wiha*) with a lifetime warranty.

I received a preproduction kit, so the body used in this article is from the old Storm. The staff at Schumacher assured me that the new Storm 2000 body will be lower and narrower, and it will fit much better.

POWERED BY EXPERIENCE

After the assembly had been completed, I needed to decide on a powerplant. I was fortunate to have Precision Motorworks* help me select an ideal motor. We chose a 13x4 Rage Class modified motor to give the Storm 2000 a reality check. The next task was to complement the motor with the nec-

essary cells. Stealth Electronics* hooked me up with a Sanyo 6-cell 1700mAh SCRC Type III Stealth pack to ensure plenty of punch. Finally, Tekin Electronics* made sure the Storm 2000 was finished to perfection. I installed Tekin's new 411-G2 speed controller and a Tekin TRM micro receiver.

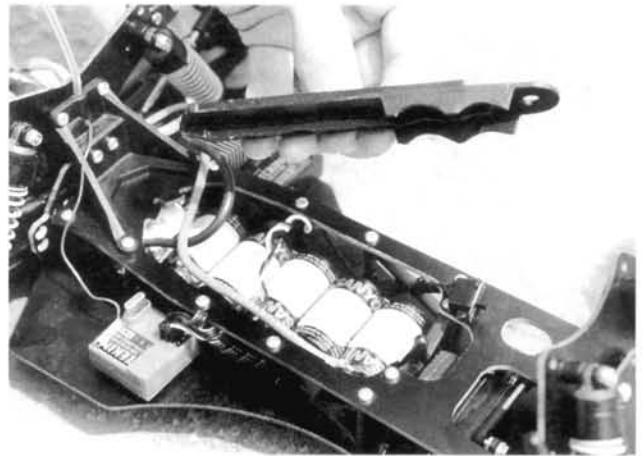
TRACK TIME

I was almost ready for the first round of testing, but I needed a special paint job to complement this topnotch ride. One phone call to MK Custom Paint* was all it took to make the polycarbonate look exceptional.

My first impression was that I had a tremendous amount of rear bite, especially when applying the throttle at corner exit.

When it was finally time to make that first run, I arranged to have the entire track to myself (except for a few spectators). The track was damp and hard-packed, so I immediately bolted some Schumacher micro-spikes onto the rear. I flipped on my switches, broke in the slipper disk and gradually adjusted the truck to the track. I cruised around, getting the feel of the track, the power and the steering reactions of the new Storm. I gradually pushed it harder and harder until I was really pulling the throttle trigger aggressively.

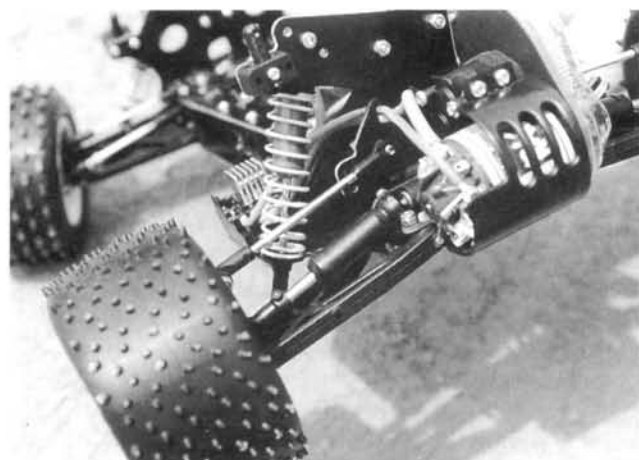
My first impression was that I had a tremendous amount of rear bite, especially when applying the throttle at corner exit. The truck was really stable in the washboard section, and it landed the jumps consistently. The truck entered the corners very aggressively and had a slight throttle-controlled push on exits. The PMW motor had a smooth power band that wouldn't bite



The battery pack is nestled in the boxed chassis and secured by this spine. You can easily mount your ESC and receiver on the large wings that are on either side of the battery.

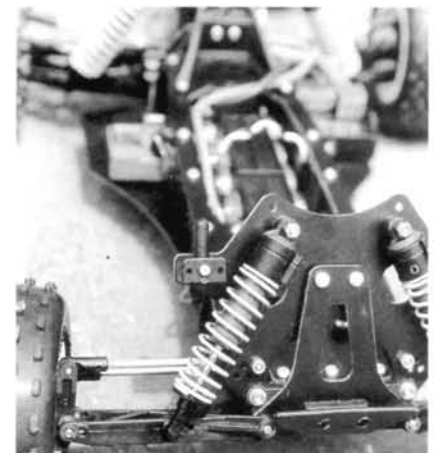


Schumacher's gear-drive transmission uses 48-pitch gears and the Storm 2000's ball differential. It's extremely smooth and dependable.



Power is delivered to the rear wheels by means of Schumacher's coaxial drive shafts. Notice the many positions available for mounting the rear upper link.

unless I was radical with the trigger. I went back to the pits to switch the battery, change the gearing and cut down some of the staggered-rib front spikes to accommodate my driving style. Overall, I had a pro-

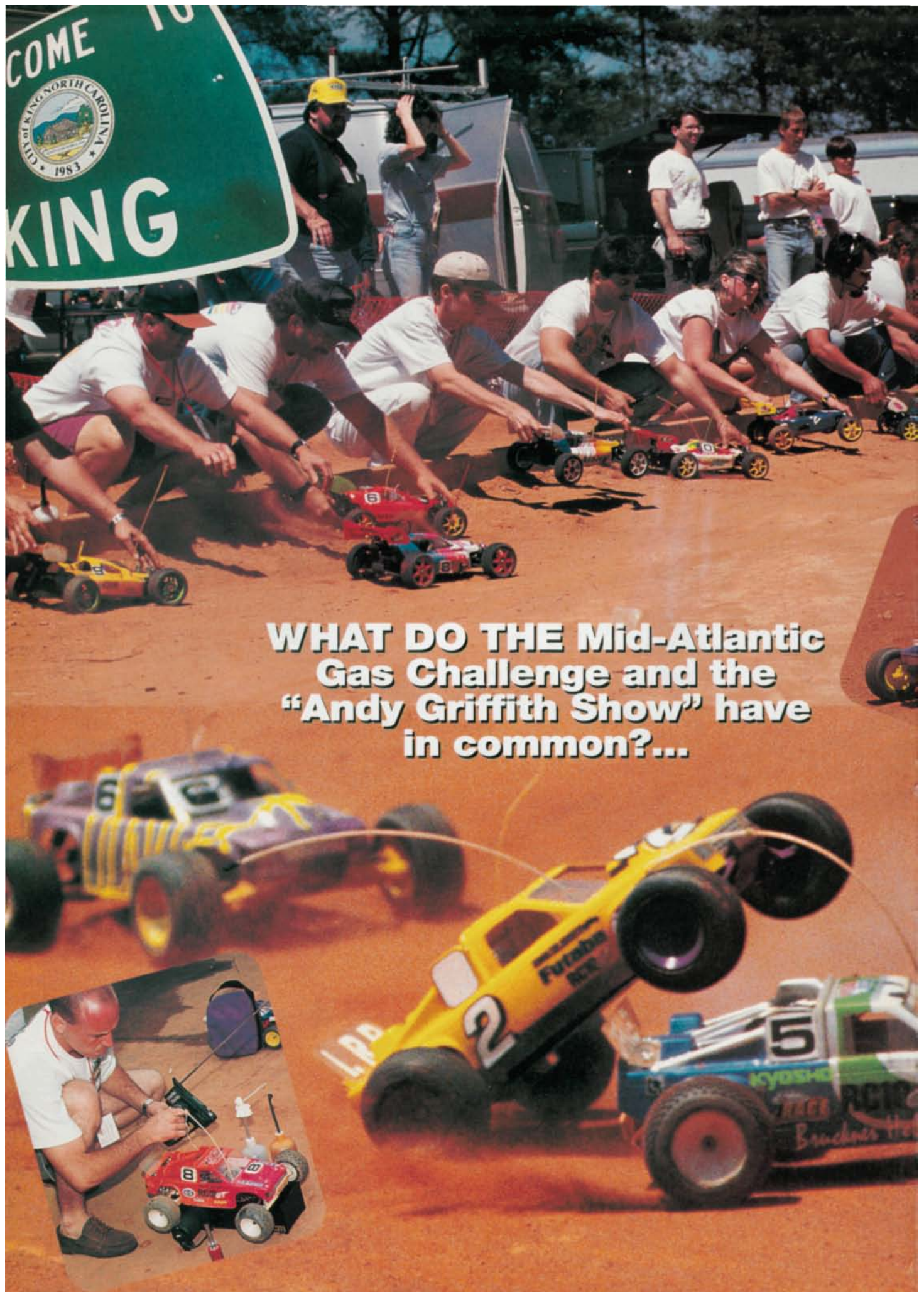


The front shock tower is bolted to the 30-degree bulkhead and is supported by a secondary plate. This assembly is very strong and stiff.

ductive day of testing. This truck is very responsive to chassis changes and did what I expected from my changes. I could definitely feel the difference on the track.

The Storm 2000 is durable, it has been designed effectively, and it will accommodate all levels of driving skill. It's easy to assemble, and you can be assured that Schumacher is dedicated to continuing development to keep it at the top of its class far into the future.

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.



**WHAT DO THE Mid-Atlantic
Gas Challenge and the
“Andy Griffith Show” have
in common?...**

MID-ATLANTIC

gas Challenge

by A.R. Flatbush

...Both take place up the road a spell from Mount Pilot, NC, and both offer a guaranteed good time. PC Hobbies, the host of the second annual Mid-Atlantic Gas Challenge, held in King, NC, is an R/C mecca that boasts an awesome off-road track, a paved tri-oval, an indoor carpet oval and a slot-car track. Folks came from all around—even from as far as California and Canada—to participate in the event, which was sponsored by Car Action, Kyosho, OFNA and Mugen. Being a gas fanatic and a long-time Andy Griffith fan, I wasn't going to miss this race.

OCTOBER 1994 61

The Kings of Fun

PC Hobbies did a great job of preparing the track and keeping everybody happy. Paul Covington (did you think "PC" stood for politically correct?) and his deputies put on a great show with a down-home atmosphere. If there had been trophies for those who had the most fun, Team Kyosho would have taken first and second, and PROCAR's John "Al Franken" Thawley, third. Kyosho pilots Kris Moore and Tim Long battled long and hard to see who could have more fun and get more laughs. Moore took the top spot by dumping a bucket of water over the head of OFNA's Dave Morales (who got the Best Sport award) at the trophy presentation. Thanks to Covington, Kris Moore, Thawley, Long and Eustace Moore, the Mid-Atlantic Gas Challenge was a blast. For more information on their events, contact PC Hobbies, P.O. Box 945, King, NC 27021; (919) 983-2514.

COOL QUALIFIERS

• **1/10-Scale 2WD Truck.** Rain had soaked the track after Friday's practice, so the first round of qualifying was pretty muddy, and the 2WD trucks quickly turned

clay-red. Things dried out quickly, though, and Brian Kinwald set a blistering pace. Chris Walrod and Eustace Moore were also on the gas, but Hemet winner B.J. Christensen struggled all day Saturday and into Sunday's final round. I spoke with Christensen before the A-Main, in which he'd be starting fourth, and he wasn't satisfied with his qualifying: "My weekend hasn't gone very well; I've been struggling the whole time."

"Isn't that exactly what happened to you at Hemet?" I asked. "And things turned out well then, didn't they?" Christensen brightened and took his truck to tech. Kinwald would start on the pole, as TQ.

• **1/8-Scale 4WD Stadium Truck.** Jay Halsey wasn't taking qualifying very seriously because he knew he was the fastest

guy in the field. He had a TQ run going, but he pulled onto pit row, just for practice. TQ went to Kris Moore, who turned a 20/7:04.11 in the last round. By the last round of qualifiers, only three other drivers had turned 20s, so Jammin' Jay wasn't worried about repeating his Hemet victory. He only had to worry about Moore and OFNA's Louis Fernandez.

• **1/8-Scale 4WD Buggy.** With 55 entrants in 4WD Buggy, qualifying was hotter than the South in August. Mugen, minus Cliff Lett, was out in force. Mugen's Matt Ledger set a seemingly untouchable pace, and his teammate Derek Furutani was also on the gas. With his Pirate RS, OFNA's Halsey was quick, but not quick enough to match Ledger.

Likewise, Kinwald and Mark Pavidis struggled throughout qualifying. In round four, though, Pavidis put together an awesome 22-lap run and snatched the TQ position from his teammates. Mugen Athletes were definitely the cars to beat; they took the first three spots on the A-Main grid and filled half the field.

And da winna is...



1/10-Scale 2WD Truck A-Main



1/10-SCALE 2WD TRUCK A-MAIN

Fin.	Qual.	Name	Chassis	Engine	Pipe	Fuel	Radio	Tires
1	4	B.J. Christensen	MIP RC10GT	CZR	MIP	O'Donnell	Airtronics	Pro-Line
2	3	Eustace Moore	MIP RC10GT	MIP CZR	MIP	O'Donnell	Airtronics	Pro-Line
3	6	Brian Lavigne	Kyosho Pro	CZ12Z	Paris	O'Donnell	KO EX1	Losi
4	5	Ty Dorsey	RC10GT	CZ12Z	RC10GT	Blue Thunder	Futaba	Pro-Line
5	8	Gene Strikeleather	A-Main/LXT	CZ12Z	Paris	Blue Thunder	Futaba	Losi
6	7	Pat Strole	A-Main/LXT	CZ12Z	N/A	Blue Thunder	Futaba	Losi
7	9	Kevin Nigg	Traxxas	CZ12Z	N/A	Blue Thunder	Futaba	Losi
8	2	Chris Walrod	Kyosho Pro	CZ12Z	O.S.	O'Donnell	Airtronics	Losi
9	10	Doug Von Mosch	A-Main/LXT	CZ2	Mugen	Mu-Juice	Airtronics	Losi
10	1	Brian Kinwald	A-Main/LXT	CZ12Z	Paris	O'Donnell	Airtronics	Losi

1/8-Scale 4WD Buggy A-Main



1/8-SCALE 4WD BUGGY A-MAIN

Fin.	Qual.	Name	Chassis	Engine	Pipe	Fuel	Radio	Tires
1	1	Mark Pavidis	Mugen	Rex 3-port	Mugen	Mu-Juice	Airtronics	Kyosho
2	5	Kris Moore	Kyosho	Paris Picco	Kyosho	O'Donnell	KO Propo	Kyosho
3	8	Jay Halsey	Pirate	Paris Picco	Paris	Blue Thunder	Airtronics	OFNA
4	9	Chris Walrod	Kyosho	Paris RXB	O.S.	O'Donnell	Airtronics	Kyosho
5	2	Matt Ledger	Mugen	Rex 3-port	Mugen	Mu-Juice	JR Remote	Kyosho
6	7	Brian Kinwald	Mugen	Rex 7-port	Mugen	Mu-Juice	Airtronics	Kyosho
7	10	Jay Katz	Pirate	Paris Picco	Paris	Blue Thunder	Airtronics	OFNA
8	6	Doug Von Mosch	Mugen	Rex 3-port	Mugen	Mu-Juice	JR Remote	Mugen
9	3	Derek Furutani	Mugen	Rex	Mugen	Mu-Juice	KO Propo	Kyosho
10	4	Chris McElroy	Pirate	Paris Picco	Paris	Blue Thunder	Airtronics	OFNA

1/8-Scale 4WD Stadium Truck A-Main



1/8-SCALE 4WD STADIUM TRUCK A-MAIN

Fin.	Qual.	Name	Chassis	Engine	Pipe	Fuel	Radio	Tires
1	2	Jay Halsey	Pirate	Paris Picco	Paris	Blue Thunder	Airtronics	Mugen
2	3	Louis Fernandez	Blazer SST	Paris Picco	OFNA	Byron	Airtronics	Kyosho
3	1	Kris Moore	Kyosho	Paris Picco	Paris	O'Donnell	KO Propo	Kyosho
4	5	Tim Tolleson	Kyosho	O.S. RFB	DuraTrax	Blue Thunder	Futaba	Kyosho
5	4	Tim Long	Kyosho	Paris Picco	Paris	O'Donnell	Airtronics	Kyosho
6	6	Frank Addington	Kyosho	O.S. RFB	O.S.	Blue Thunder	Airtronics	Kyosho
7	7	Dave Sproul	Kyosho	SRT	Kyosho	O'Donnell	KO Propo	Kyosho
8	8	Joey Smith	Kyosho	Rex 3-port	N/A	Blue Thunder	Futaba	Kyosho
9	9	John Stokes	Kyosho	O.S. EX-B	O.S.	O'Donnell	KO Propo	Kyosho
10	10	Carmon Vincent	Pirate	Rex 3-port	OFNA	Blue Thunder	Airtronics	Kyosho



MIP's B.J. Christensen won Hemet with a modified Traxxas and won King with a tweaked RC10GT. Does that mean that he'll win at Detroit with an MIP Schumacher or Kyosho?

Eustace Moore of MIP fame was the undisputed king of "trickarama" at King. Fresh off a West Coast Challenge win, he and fellow Team MIP driver B.J. Christensen showed up at the Mid-Atlantic Gas Challenge with new rides armed with new gas weapons. The MIP tricksters had traded in their tricked-out Traxxas Nitro Hawks for Associated RC10GTs, and Christensen and Moore went 1-2 at King, proving that Hemet wasn't a fluke. Here are just some of the goodies lurking under the MIP hood. (Moore is developing 1/8-scale products as well.)

• **MIP clutch.** A centrifugal clutch eliminates the need for a slipper clutch and/or a Hydra Drive. Slippers are locked down. Says Moore, "I ran the same clutch in the muddy first qualifier and the dry-slick A-Main, and it worked great in both conditions!" The MIP clutch is designed specifically for the RC10GT and has an extension-style spring. It lists for only \$11.95.

• **MIP 360 Stinger.** The Curly-Q header and compact pipe come with a special shock tower/pipe mount. The very clean, compact design produces mucho low-end torque, and the Stinger weighs less than most systems. MIP has Stinger kits

What's New in the Pits?

for the Nitro Hawk (\$52.95) and the RC10GT (\$49.95); each kit includes a header, a pipe, a pressure fitting, a shock tower and mounts. Moore plans to offer Stingers for the Kyosho Pro and Schumacher vehicles (when the design has been finalized).

• **RC10GT ball-bearing steering kit.** The molded arms ride on Teflon-sealed bearings for quicker, more precise steering. The kit costs \$24.95.

• **RC10GT diff rebuild kit.** This is just like the MIP electric diff kits, but it's designed for gas vehicles. The kit costs \$10.95.

• **11.5 stretch kit for RC10GT.** This kit will lengthen your wheelbase to the legal maximum and make your truck more stable. It costs \$14.95.

• **Onboard temperature gauge.** This electronic sensor monitors head temperature for optimum needle setting. The finished product will be about the size of a 9V battery or servo and will cost about \$35.



ACTION-PACKED A-MAINS

• **1/10-Scale 2WD Truck.** Kinwald took the point, with MIP aces Eustace Moore and B.J. Christensen all over him. Kinwald's lead didn't last long, though; his truck suffered an uncharacteristic flameout. Moore inherited the lead, but it wasn't long before Christensen took control. Christensen had an easier run here than at Hemet, and he won easily over an ecstatic Moore. Chris Walrod had third place sewn up until he stripped his spur gear late in the race and handed third to his Kyosho teammate Brian Lavigne.

• **1/8-Scale 4WD Stadium Truck.** Jay Halsey battled with Louis Fernandez early in the A-Main but, after the first round of pit stops, Halsey was long gone. Kris Moore suffered problems in the chaotic early laps but, by the first pit stop, he had moved into the final podium position. Halsey lapped the field on his way to the win. As at Hemet, he carried a lot of momentum into the buggy A-Main.

• **1/8-Scale 4WD Buggy.** Mark Pavidis put his TQ Mugen into the lead off the start, but Halsey was hot on his heels, along with Kinwald, Kris Moore and Walrod. During the first round of pit stops, Kinwald flamed



The King track was way muddy one day...

out, and this put him a lap down. Pavidis, Halsey and Moore set a blistering pace around the King circuit, which had developed a serious blue groove. Late in the race, as the heat, pace and abusive track surface took their toll, tire wear became a big problem. Driving off the blue groove was like driving on ice with slicks. Pavidis made the fewest mistakes and won the 30-minute Main, and Moore edged out Halsey in a controversial finish. (With five Mugens on the track, it was hard to deal with traffic getting to Pavidis.) Nevertheless, Halsey ran

out of fuel with less than a minute to go and dropped from a close second (and possible win) to a distant third.

Pavidis, who was likened to a snapping turtle because he's so hard to turn over, credited his win to a conservative pit strategy. "I planned from the beginning to make four stops," he reflected. "Those, like Halsey, who planned on three, were cutting it too close for comfort. I led early, but gave it up in the pits. But I wasn't worried.

By the middle of the race, I had caught Halsey, and we battled pretty hard for 5 or 10 minutes. We were really going at it. He had some fuel problem there at the end, so my strategy paid off."

...and the next was so dry and packed that it started to form a blue groove. Tires didn't last too long on the hard-packed surface.

THE NEXT GENERATION of ESCs from Team Novak* is faster, smarter, more reliable and much easier to use. Advances in micro-processor technology have allowed the engineers at Novak to add features that would have been impossible a few years ago.

The Duster Sport™, which replaces Novak's 410 M5, answers the needs of sport drivers who demand ESCs that can adapt to a variety of drivers, radios and cars—yet are still affordable. It was given a healthy dose of fresh engineering using high-tech components, with constant attention given to the type of drivers who would be using it.

Making the Duster simple to use was top priority. Keypads and multiple potentiometers were thrown out in favor of just one button on the entire ESC. Using the new One-Touch Set-Up is easy: just press the "set" button, pull full throttle on your radio, and then push full brake. The Duster does all the work for you.

Although it's easy to use, there's more to this ESC than meets the eye. To prevent the car from accidentally moving during setup, a microcomputer disables the motor. The transmitter's neutral, high-speed and full-brake settings are then precisely measured using a timing device similar to that of a precision watch. The Duster can match the transmitter's setup points with extreme accuracy, providing racers with consistent response. All information is stored in the ESC's memory—even when it's turned off and the power is disconnected.

To prevent radio problems, digital glitch-prevention circuitry has been added. The Duster learns the transmitter's signal pattern and continuously monitors it for any changes that might indicate radio interference or glitching. It ignores all the interfering signals and only responds to the proper transmitter patterns; this virtually eliminates problems owing to radio interference.

Dual-level thermal protection is

another new safety feature. The Duster monitors the transistors' temperature; if it rises to 240 degrees Fahrenheit, the Duster's maximum power output is reduced to 50 percent. If the temperature continues to rise and reaches 295 degrees, the Duster will shut down completely. After the transistors have cooled, it's ready to run again. This provides extra safety for sport applications, during which normal ESCs are frequently damaged by locked-up transmissions and bad motors.

Radio Priority Circuitry™ is another high-tech feature that's unique to Novak's ESCs. To

makes setting the ESC quick and easy. On the track, Radio Priority Circuitry will amaze veteran R/C racers because the car can now be driven until it just won't move. Even when the throttle is hammered from a dead stop using a dumped pack, the Duster will have complete control of the radio. All the features combine to make an intelligent ESC that's easy to use and fun to drive.

All you hardcore racers out there, stay tuned for the racing versions: the Hammer Pro and the Racer. Both address the needs of racers who are looking for that extra edge.

*Addresses are listed alphabetically in the Index of Manufacturers on page 153. ■

Setting up the Duster is as easy as pushing a button.

**NEW
PRODUCT
WATCH**

avoid loss of radio control when a battery pack dumps at the end of a race, the circuitry continuously monitors battery-pack voltage. It adjusts the ESC to prevent the motor from dropping the battery voltage too low for proper radio operation.

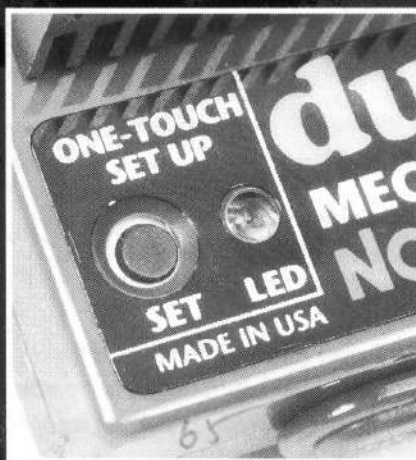
The servo and the receiver are always fully operational, and the car will never go out of control—even when the battery has completely dumped.

The best way to appreciate these new features is to get behind the wheel and do some driving. One-Touch Set-Up



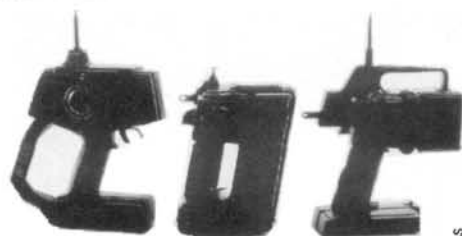
Novak's New ESCs

Duster Sport™



Radio Basics

by DOUG MERTES



What do all these dials and knobs do, anyway?

PHOTOS BY WALTER SIDAS

IT USED TO BE that radio-control transmitter systems were very simple. They had steering and throttle controls, servo-centering adjustment, maybe even servo-reversing. Those systems worked well when R/C car manufacturers were frequently more concerned about longevity than performance.

Over time, R/C cars became more sophisticated, and radio systems began to improve. First we saw servo-travel and endpoint adjustments and, over the last few years, there have been so many innovations that many racers can't keep up with them all.

Let's take a look at four transmitter/receiver combinations—Futaba's* PCM, Airtronics'* Caliber, KO Propo's* EX10 and the JR*-756—and some typical transmitter adjustments, and see what each can do for you. All three radios are FM or FM/PCM, which means they offer the state of the art in resistance to interference. The JR, the KO and Airtronics units also have the ability to store multiple model setups in memory—a feature rumored to be included on the updated Futaba PCM that will be on the market some time in the near future.

One thing I'm not going to do, however, is take you through the exact adjustment process for each transmitter model. You'll need to *carefully* read and understand the instruction manual for each of these radios to get the most out of your investment. I even take my manual to the track with me!

Do you really need PCM (pulse code modulation)? Many drivers think that this is overkill (even at the regional and national levels) and, instead, they use after-market FM (frequency modulation) receivers made by Tekin* or Novak*. Others swear by PCM's resistance to glitching in even the most hostile, indoor, metal-filled environment. You certainly should take a serious look at FM, even if you're an infrequent user of gas-powered cars or trucks. Its inherently superior resistance to interference when compared with AM (amplitude modulation) makes it a natural choice for those concerned about losing control of a heavy, fast, gas car or truck.



STEERING/CHANNEL ONE

• **End-point adjustment, or EPA** (also called steering travel or steering ATV). This adjustment determines the total range of travel, in degrees, of the servo throw from maximum left to maximum right. All three of these transmitters allow you to set EPA independently for left and right travel (in the case of the JR and the KO, this is called "steering balance"; the Airtronics and Futaba radios simply set travel independently for each direction with a separate dial or setting). You may find this advantageous when running on an oval, for instance. Racers seldom turn to the right in that form of racing, and when they do, they don't usually want to move in that direction very quickly. Some cars (the original RC10 comes to mind) also have steering linkage that, through



some quirk of design geometry, ends up turning farther in one direction than in the other, and this adjustment will even that tendency out. You can also use EPA to keep your servo from extending too far (hitting the end stops on the steering spindles and trying to keep on turning). That kind of activity throws the potentiometer that centers the servo out of whack.

• **Steering rate** (also called steering curve, exponential, or rate control). This adjustment determines the amount of wheel travel that corresponds to the degree of steering-control travel. It can usually be tailored for both the initial and final portion of servo travel, and it's the one that manages to confuse many racers. Why would you ever want your car to steer less or more than the amount you turn the steering wheel?

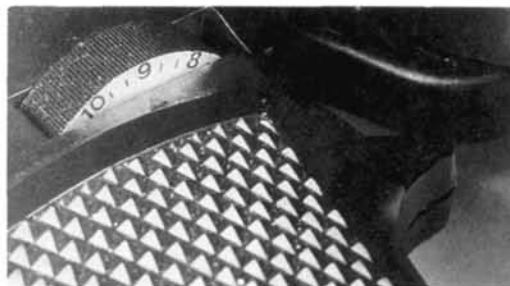


• **Sub-trim** (also called servo centering, or trim memory). This adjusts the "true center" of the steering servo. Most servos are a little off center, and this allows you to correct that deficiency without having to use the steering-trim centering control on the main panel.



away on a banked oval track, or to make certain that your car is tracking in a straight line just before the start of your on-road or off-road race.

• **Steering trim.** This is usually a mechanical or slider control adjustment found on the radio case that determines the track that the car will take when the steering wheel is released. Use this adjustment to make your car drift slowly to the outside as it travels down the straight-



• **Dual rate.** Like the centering control, this is also usually a dial or slider located somewhere near the hand grip; many systems allow you to alter this control with your thumb without removing your hand from the steering or throttle inputs. I call this one the "whoa! control," since it's the one I usually hit right after I discover that I have way too much steering response entering the first turn on the oval. Basically, it controls how far the wheels will turn in both directions.

Think of it this way. Let's say you have a car that's very hard to control in a straight line. As soon as you try to give it a little steering, it veers off sharply, or spins out. No matter how hard you try, it's just too sensitive on the fast straight. By adding a little exponential control, you can desensitize the steering for straight-line running, but you still have all the servo travel you had when you turn the wheel fully in either direction. Basically, it desensitizes or sensitizes your steering control.

THROTTLE/CHANNEL TWO

• **Throttle EPA (also called throttle ATV).** This setting determines the width of the control range that the transmitter uses when talking to the electronic speed control or throttle servo. With most ESCs, you can set them to their maximum setting to get the smoothest response.

With a gas car, use this setting to limit how far the servo rotates. For example, pull the trigger all the way back, and then use the right EPA to limit the servo to just enough throw to open the carb fully.



• **Throttle trim.** Like the dual-rate steering control, this is usually a mechanical dial, button, or slider that you can access from the hand grip without removing your hands from the inputs. On the Futaba, it's a pair of push-buttons. Use this control to increase or decrease



braking of the ESC before or during a race. In essence, you're making minor variations in the throttle neutral point with this control. The adjustment range on all three of these systems is broad enough so that you can go all the way from hard brakes when the throttle is released to no brakes at all.



• **Sub-trim.** Sub-trim is a fine adjustment for the throttle center position. It's used for setting a radio up to center a servo or match the radio to an ESC. Use the sub-trim initially, and then use the standard trim if you need to on the track.

• **Throttle curve (also called throttle exponential, or throttle rate).** Like the steering-rate control, this one confuses a lot of people! This adjustment sensitizes or desensitizes the initial and final portions of the throttle-input curve, without affecting overall throttle travel.

Want to make your car squirt or punch out of turns on a high-bite surface? Crank up the throttle-curve rate numerically and more throttle will dump in at the beginning of trigger travel, less at the end. Concerned about standing starts on dusty pavement or hard-packed dirt? Turn the throttle rate down numerically, and you stand a better chance of avoiding a dreaded spinout at the starting line, while still being able to give it full throttle when you're headed down the straight.



• **ATL (on Futaba PCM).** Throttle ATL isn't understood by many people, yet it's very simple. It controls how much travel the servo has toward the brake side. Set it to 10 for maximum throw, and adjust the brakes on your ESC or throttle linkage for maximum power. When running, test the brakes by jamming on them. If they lock up too easily, just turn the ATL down a little. The nice thing about this feature is that it doesn't change the neutral or high-speed settings.



GENERAL ADJUSTMENTS

The Futaba, JR KO and Airtronics radios also offer several additional features that many users find worthwhile:



• **Third-channel mixing.** You can set the action of a third servo or other electronic device through a mixed third receiver channel. Normally, this is used only by the gas-car and boat crowd, but I've also seen some amusing demonstrations of sound effects, driver-figure head-turning and arm-waving when this channel is used.

• **Direct servo control.** By connecting the DSC output socket on the transmitter with the battery input slot on the receiver, you can make transmitter adjustments in the pits without transmitting any radio signals. While I applaud the manufacturers on this one, you're rarely allowed to get your radio out of impound during a race. Even then, fellow racers will watch you like a hawk, uncertain as to why you get to play with your radio without raising the ire of the race director, while they must leave theirs on the shelf.

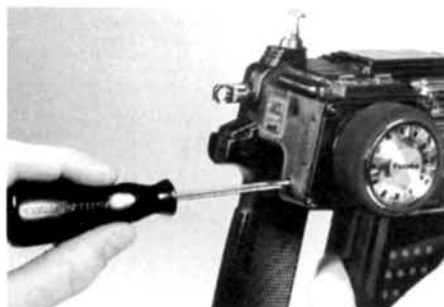


• **Fail-safe.** The Futaba PCM, KO Propo EX10 and JR 756 each have a fail-safe feature to protect your investment. With this function, you can preset a position for your throttle servo to return to in the event that the receiver loses its signal. This is a very good feature for gas-powered vehicles.



• **Stopwatch, lap timer or up-timer.** This allows you to time your laps in practice, determine the length of a practice section, or dispute your posted times at club races. I use this neat feature every time I practice so that I can become familiar with the way the car changes during a run.

• **Screen brightness.** The JR, the KO and the Airtronics radios use LCD screens. Sunny days and indoor lighting require different contrast levels, and these systems allow you to make several brightness adjustments.



• **Wheel tension.** A simple spring-tension adjustment under the steering wheel increases or decreases the force necessary to turn the wheel control. This isn't something I've played with a lot, but I

suppose it would help a truly heavy-handed driver learn to be more subtle.

If you want to buy a new radio system, I would advise you to take a close look at all four of these. Choose the transmitter that fits your hand best and buy that one, because each of them can easily be tailored to your individual driving style.

**Addresses are listed alphabetically in the Index of Manufacturers on page 153.*

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ASSOCIATED

by FRANK MASI

WORKS RC10

AFTER 10 YEARS, the Associated* RC10 is still winning races. How in the world is this possible? For starters, Associated got the RC10 design right the first time; this much is true. Second, the RC10 has undergone continual improvement. Beginning with the short-arm, gold-chassis version, Associated added long front suspension arms and a graphite-plate chassis to create the RC10 Graphite. Realizing that the original car's aluminum-tub chassis improved the RC10's performance (especially on bumpy tracks), Associated merged the tub and the Graphite car's improvements into a new kit—the Championship Edition. The next leap was the release of the Stealth

TEAM CAR

transmission. This new gearbox was a huge improvement and could be fitted to any RC10. Associated decided to market a kit that included not only the Stealth, but also some of the parts that had previously been available only to team drivers. The Team Car, with its hard-anodized shocks and black aluminum chassis, was a big hit with racers.

TIME FOR A CHANGE

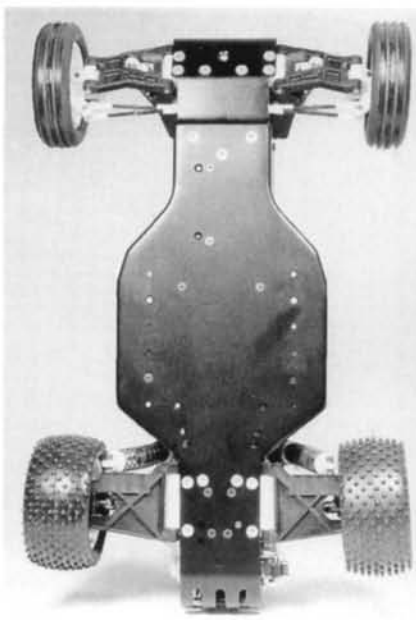
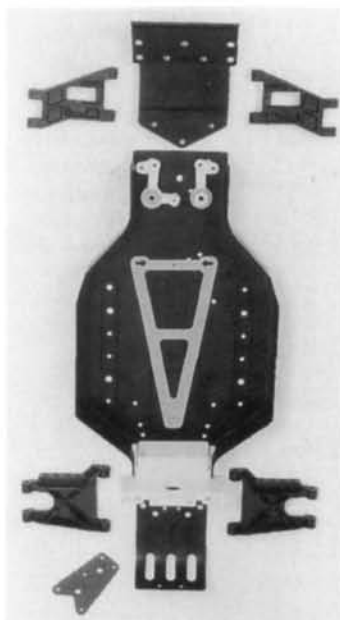
For more than three years, the Team Car has carried Associated's performance banner with few changes. When they decided to run the Team Car instead of the prototype Stealth car at the most recent IFMAR World Championships (held in England in July '93), Associated designed several new parts that would bring the Team Car's performance to an even higher level. To say that these mods were successful would be an understatement; Associated won the Worlds, and these special RC10s virtually dominated the A-Main at the '94 Florida Winter Championships.

After thorough testing and evaluation by Associated team drivers, the company is now producing this special car in kit form—the RC10 Worlds Car.

A WORLD OF DIFFERENCE

The Worlds Car has everything that the team drivers' cars have, plus a few all-new goodies. First, the car's tub chassis has been stamped out of a lighter, stronger aluminum. Its bottom is milled out, and the entire tub is hard-anodized. The new tub saves a lot of weight, and its increased strength helps the suspension to do its job more effectively.

The aluminum nose plate has also received the "factory touch": a lot of material has been removed from the area surrounding the holes through which the attachment screws are threaded; this saves even more weight.



Same old Team Car? Look again! These are just some of the many new and improved parts that make up the Worlds Car.

BIG-TIME SUSPENSION BEEF-UPS

The front and rear arms of the Worlds Car are molded of a black composite material

WORLDS CAR

that's more rigid than the white nylon used for the Team Car's arms. Flexing arms will change a car's suspension geometry and mess up its handling. This is common on bumpy tracks. The new, stiffer arms should eliminate—or at least minimize—this problem.

Stronger shock towers made of graphite-laminated fiberglass replace the Team Car's fiberglass pieces. These new towers flex less than pure fiberglass ones, so the shocks absorb impact instead of transmitting it to the rest of the chassis.

With the new chassis, suspension arms and shock tower, Associated has given the Worlds Car a much more rigid platform, which allows it to handle more predictably. No surprises!

TEAM ASSOCIATED WORLDS CAR

Scale 1/10
List price \$337

DIMENSIONS

Overall length 15.25 in.
Wheelbase 10.5 in.
Front width 9.625 in.
Rear width 9.625 in.

WEIGHT

Gross (ready to run) 3 lb., 10 oz.

CHASSIS

Type Stamped tub
Material Aluminum

DRIVE TRAIN

Primary Pinion/spur
Transmission Sealed gearbox/gear reduction (2.25:1)
Differential(s) Adjustable ball diff
Slipper clutch Adjustable friction slipper
Bearings Metal-sealed bearings, Teflon-sealed outdrive bearings
Drive shafts Universal joint

SUSPENSION

F/R: Type Independent A-arm w/upper, adjustable camber link
Damping Oil-filled, coil-over shocks w/hard-anodized bodies

WHEELS

Front: Type Three-piece molded nylon
Dimensions (DxW) 2.2x0.75 in.
Rear: Type One-piece molded nylon
Dimensions (DxW) 2.175x1.375 in.

TIRES

Front Pro-Line four-piece ribbed
Rear Pro-Line Pro-86 XTR Flat Stubbies

ELECTRICS

..... Not included

OPTIONS TESTED

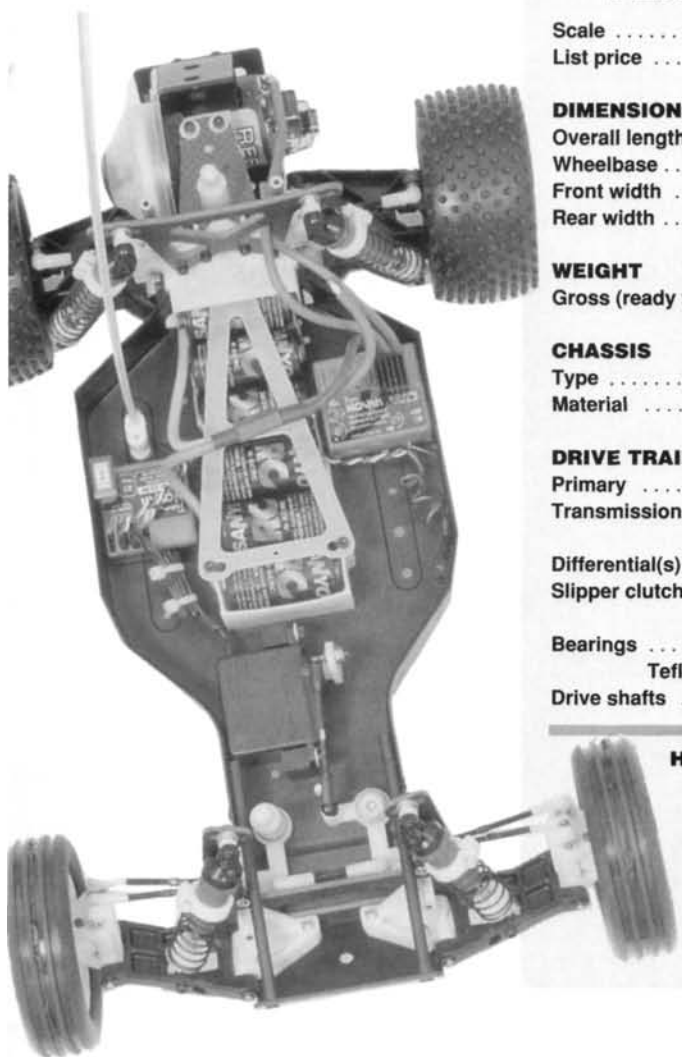
Airtronics Caliber 3P transmitter; Airtronics 94151 steering servo; Novak NER-3FM receiver; Novak 410-HPc ESC; Reedy matched Sanyo 1700mAh SCRC cells; Reedy Sonic M (13-turn double-wind) modified motor.

HITS

• New, stronger, lighter tub chassis, stiffer arms and shock towers • Pro-Line tires • New bell-crank steering • Comprehensive instructions and tuning guide • Reasonable price

MISSES

• Some parts lack refinement • Some hand-fitting is required

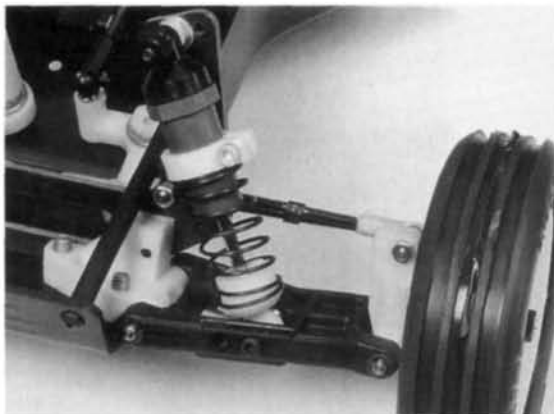




Why Limit Shock Travel?

If the purpose of an off-road buggy is to go over rough, bumpy surfaces, why would you limit the travel of its shocks, as Associated recommends? The reason is that for optimal performance, your car's shocks should extend just far enough to allow the tires to drop into any holes in the track's surface. Excessive downward shock travel will make your car feel "floaty" when driven on a smooth track; your car will roll too much in the corners and will pitch from front to rear under acceleration and braking.

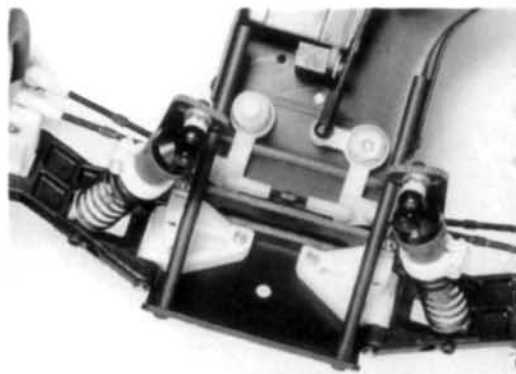
As a rule of thumb, limit the shocks' travel more when you're running on very smooth tracks and less on bumpy tracks. Avoid extremes, however; don't limit the travel so much that your car sits below its proper ride height. At the other extreme, allowing too much travel may cause suspension-geometry problems and may cause the drive shafts to be ejected from the transmission outdrives.



Left: the Worlds Car has suspension arms molded of a rigid composite material. Its 30-degree front hub carriers are new, as is its graphite-laminated, fiberglass shock tower. Pro-Line's XT-compound, four-rib tires come with the kit.



See the new bulkhead? It's pretty trick! It's a little taller, so it meets the included Stealth tranny brace, and it has a new camber-rod mounting hole. Notice that I've soldered two Schottky diodes to the Reedy Sonic motor for even more braking power.



Associated designed this new solid-bellcrank steering system for the Worlds Car. It's supported by bronze bushings for smooth operation. Note that the front nose plate has been trimmed to save weight.

SHOCKING IMPROVEMENTS

The Worlds Car uses shorter rear shock shafts (1.02 inches long, compared with the Team Car's 1.32-inch-long shafts). This means that damping is more consistent because the piston stays in the shock oil where it belongs. When you move the rear suspension up and down, you won't hear the squishy sound of shock oil mixing with air.

New Teflon shock seals and pistons come with the Worlds Car. The seals fit the shock body more precisely and allow the shock shaft to operate with less friction (and stiction). The Teflon pistons also fit the body more tightly, so less shock oil will seep out around their edges, and harsh jolts won't change the way the shocks react.

Three sets of pistons—each with dif-

ferent-size holes—are included with the kit. Use these pistons to alter the shock's valving.

STEALTH TRANNY UPGRADES

The Worlds Car has a Stealth transmission that's nearly identical to the Team Car's; it has a smooth, adjustable ball differential with hardened-steel outdrives; durable, tungsten-carbide diff balls; sealed ball bearings (Teflon-sealed outdrive bear-

ings); and an Associated Traction Control (ATC) friction slipper clutch.

To increase acceleration, a new solid bushing replaces the ball bearing in the slipper-clutch assembly. Also, a new 48-pitch, 81-tooth Stealth spur gear is included; it's molded of nylon and was designed specifically to fit the Stealth tranny. Associated also includes a graphite tranny brace—previously available only as a hop-up part.



The rear shock tower is also made of graphite-laminated fiberglass for extra rigidity. The tower has a fourth shock-mounting hole for added "tunability." I used Deans' Ultra Plugs to connect the ESC to the battery pack.

NEW REAR BULK-HEAD-FINALLY!

Associated finally decided that it was time to mold a new rear bulkhead. The old bulkhead was starting to show its age; its top part never quite matched the height of the transmission brace when the Stealth transmission was installed. A couple of spacers between the plate and the bulkhead solved this, but in a very un-Associated

fashion. Also, some of the outer camber-rod holes weren't used at all anymore. In fact, most team drivers used a hole that didn't even exist in the original bulkhead. It was drilled in line with the upper holes and approximately 0.200 inch from the inner hole.

The new bulkhead fixes all these problems. It's taller so it meets the tranny brace; it no longer has most of the outer camber-rod holes; and it has the "secret" team camber-rod hole.



Pro-Line's Flat Stubbies, in XTR compound, come with the Worlds Car kit. They're mounted on Associated's one-piece, 2.175-inch-diameter wheels.

NEW BELLCRANKS

The new bellcranks are molded of nylon, and they pivot on bronze bushings, but you can replace the bushings with $\frac{1}{4} \times \frac{3}{8}$ -inch flanged ball bearings (the same size and type used to support the rear drive shafts in the hub carriers). I found that the bellcranks work as smoothly and freely as any after-market set I've used.

The old bellcranks also functioned as a servo-saver, but the new ones don't. If you're an expert driver, or if you have an ample supply of replacement gears for your steering servo, you can use a rigid servo horn to connect the steering linkage. If not, get a good, off-road servo-saver.

CONSTRUCTION INSTRUCTION

Although they could have gotten away with providing Team Car instructions with a supplement sheet that covered the new parts, Associated published a brand-new manual for the Worlds Car.

A supplement sheet that covers the standard setup for the Worlds Car is included. It details the settings used by team drivers

(Continued on page 92)

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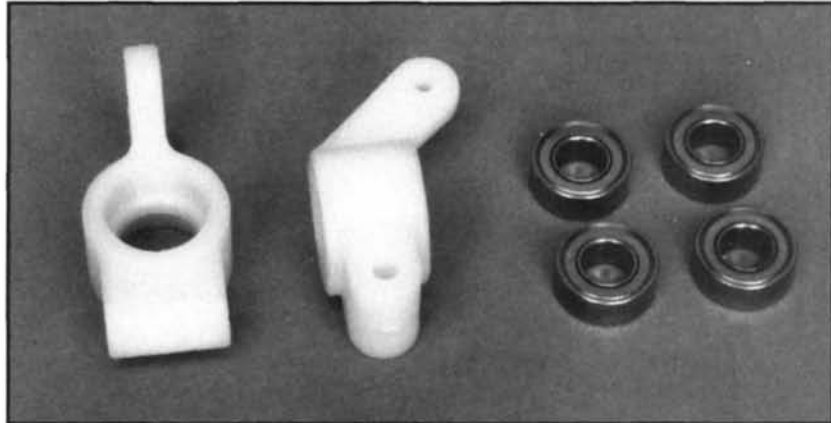


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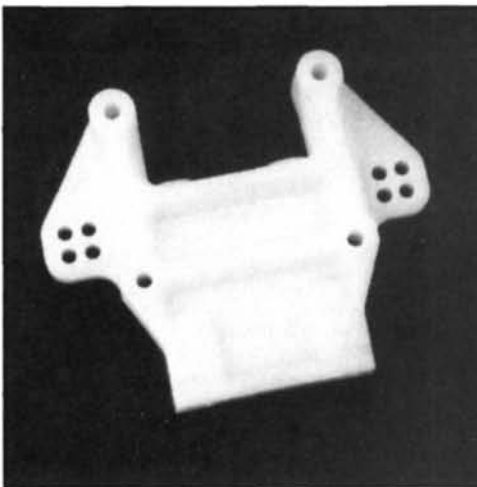
NEW
ITEMS!

#7023 1/4 x 1/2 Bearings & Carriers - Retail \$29.95 (for RC10GT & RC10T Trucks)



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When to MODIFY

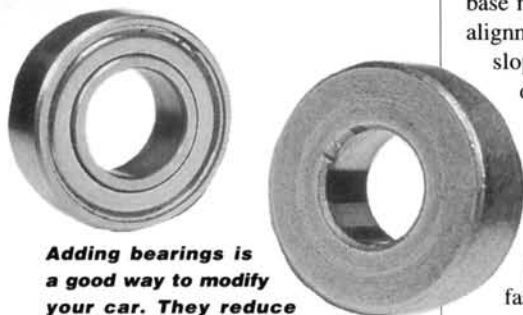
• b y B R I A N L E S L I E •



SO YOU THINK it's time to modify your R/C car? Before you reach for your wallet, ask yourself this: can I drive for four minutes without crashing? Do I go sideways more than straight? Do I use all the track plus the pit area and the drivers' stand every lap? If so, you don't need more power; you need practice! Many racers modify before their time, usually for speed, durability, or vanity. To go faster, last longer and look better, you need to get back to basics.

MAINTAIN YOURSELF

Keep it simple, keep it stock, and maintain it. This advice comes straight from Cliff



Adding bearings is a good way to modify your car. They reduce friction and increase run times and speed.

Lett—R/C car driver extraordinaire. Inspect your car after every run. Check for shock leaks (excessive dirt buildup at the shock's base means it's time to rebuild), front-end alignment, loose nuts and bolts, bellcrank slop, bent tie rods and a gritty-feeling diff. Most of all, keep the car clean so that you can detect problems before they sideline you. See the August '93 issue (page 172) "Clean Your Machine" for car-care how-to's. A clean car means less weight, so you'll have longer run times and faster speeds, your parts will last longer and, ultimately, you'll save money. So be intimate with your car, know it inside and out, and always do your own work.

IT KEEPS BREAKING...

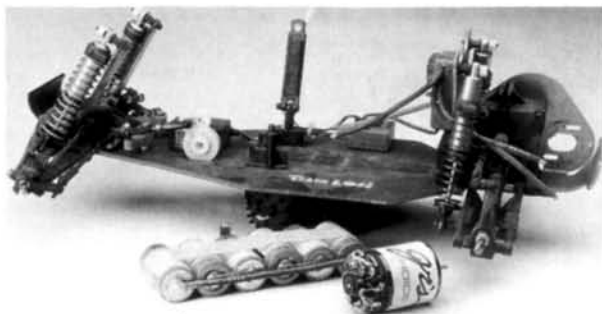
If your car has a low durability factor, you might want to consider upgrading the most commonly replaced parts with after-market items. Before you go upgrade-crazy, visit a hobby shop and a racetrack to see which upgrades are recommended and which will work best for you. Remember: only buy what you really need; you want added durability—not more speed! After you've made a list of upgrades, add up the cost. If it equals the cost of a race-ready buggy, forget the upgrades and buy a new car.

THE LETTER "V," PLEASE, VANNA

Vanity. Everyone wants the latest, trickiest, best-looking car at his or her track. There's nothing wrong with that, but before you dive headfirst into the world of concours with your credit card in hand, consider this: a pretty car doesn't go faster, handle better, run longer, or win races. When goodies break, they can be expensive to replace, and the prettier the car, the less you may want to

Modify no car

drive it, which means you won't practice. Stock can still look nice: pay attention to detail and keep it clean and waxed. In other words, take care of what you have, and save your money for other items that will mechanically—not visually—enhance the car. If your goal is to win races and keep costs down, stay stock. But if show is your goal, do it up and have fun!



Before you begin to modify, optimize what you already have. Clean and inspect your car after every run, and look for potential problems. Check for shock leaks, and repair damaged and loose suspension components.

BUT MOM, JOEY HAS ONE

Don't modify or upgrade something just because you saw it on the national champ's car or because your best friend has one. What works for one car doesn't always work for another, and besides, most of the factory-sponsored guys would win if they were driving something from Toys "R" Us. Factory guys modify to shave tenths of a second off their lap times. If you're like me, chances are you're trying to shave seconds or even minutes!

PRACTICE, PRACTICE, PRACTICE

Don't get lazy by adding more power. Anyone can go fast on the straights—even me! Negotiating corners, jumps, tabletops and whoop-de-dos smoothly and consistently is what wins races. Sacrifice straightaway speed for better handling, smoother

use something that won't damage your car if you hit it), and come as close to them as you can. Do this lap after lap, no matter how slowly you need to go to do it. Soon, you'll see your line tighten, and your lap times will decrease.

- More advanced racers who can already hold a tight line should try practicing with a slightly modified motor instead of a stocker. This will increase your reaction time because of the additional speed and power. On race day, when you put your stock motor back in, it will seem slower and much more controllable. Cliff Lett is quick to warn people who try this that a stock motor's braking power is much greater than

that of a modified motor, because there are fewer winds in a modified motor. You might want to practice with your stock motor the day before the race to get reacquainted with its performance.

- Leave the air to Jordan. Catching a lot of air on jumps is exciting, but it doesn't win races. To go forward, the rear wheels

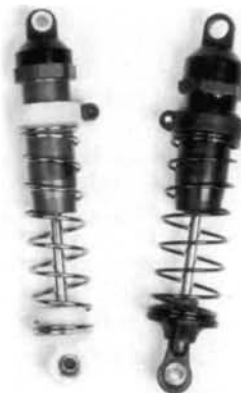
must be on the ground. Tabletops are the worst causes of hang time. Eliminate hang time by slightly tapping the brakes just before takeoff. This will drastically cut down on air time while dropping the front end in preparation for landing. To plant the rear wheels on the ground before the fronts hit and propel the car forward, punch the

throttle before it lands; this will also absorb stress from the chassis and make the car more stable.

CLIFF LETT'S PRACTICING TIPS

Keep notes on your car's setup, and record how changes affect the car. Watch your own car, not the one running next to yours; your car has a tendency to follow your eyes. Drive from corner to corner. Don't get ahead of yourself. Gear down, even to the point of being ridiculously slow. Keep your corners tight, and maintain your line lap after lap. Find your comfort zone (the speed at which you can get around the track in

complete and total control while maintaining the same, consistent line). This should be at about 70 to 80 percent of your total ability. When you reach 90 percent and above, you're pushing the outer limits, and Cliff says that this zone is only recommended on an as-needed basis and shouldn't be used full time—even at a pro level.



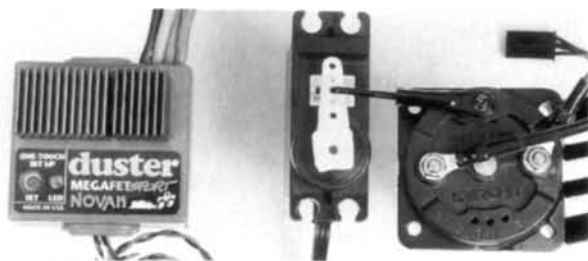
High-quality shock absorbers will improve any R/C car's performance. These Associated aluminum shocks are designed to be extremely smooth and durable.

MODIFICATIONS EVERYONE CAN USE

No matter what your skill level, a high-frequency electronic speed controller (ESC)

is at the top of my modification list. They make driving easier and put less wear and tear on the motor and the drive train (see the August '93 issue for more information on ESCs). Ball bearings mean less friction, and that means longer run times. Hard-body shocks provide smoother operation, so you'll have more control in the rough sections of the track, and they last longer between rebuilds. Matched battery packs supply higher speeds and sustain those speeds longer. Don't go for the ultra-high numbered, super-matched cells that also have high price tags; get some middle-of-the-road batteries, and follow charging and discharging directions religiously. But remember, practice makes you faster—not modifications—so forget all about that, and learn how to drive your car!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.



Electronic speed controllers, such as the Duster shown here, vastly outperform mechanical models. In an ESC, there aren't any moving parts or contacts to fail.

throttle control and jumping techniques. Increase skill, not power.

Don't try to break the sound barrier every time you hit the track. Speed will come, but first, you have to learn how to stay in control. Here are some recommendations.

- Put markers along the track (obviously,

before it's time!

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WORLDS CAR

(Continued from page 81)

and offers definitions and explanations of some of the more complicated subjects. Keep this sheet handy when you build your car; follow the standard setup right off the bat. Also, keep the supplement in your toolbox for quick references.

SETTING UP

I was able to transfer all the radio gear and electronics from my old Team Car to the Worlds Car. The Airtronics* 94151 steering servo was easy to bolt right in because I had already drilled holes in the blank nylon mounts provided. I wish Associated would provide pre-drilled servo mounts. The tub chassis for the Worlds Car is the same size as the Team Car's, so I had no trouble fitting in the Novak* 410-HPc ESC and NER-3FM receiver.

I installed a set of six Reedy* matched Sanyo 1700mAh SCRC cells and secured them with the car's new fiberglass hold-down brace. I also used a Reedy Sonic M motor.

The car comes with the same RCPS Turbo Mirage body the team drivers use. It sits low, looks super-aggressive and even has a neat ESC-cooling scoop molded into

its left side. The Worlds Car includes a pair of Pro-Line* Flat Stubbies (in soft XTR compound with foam inserts) for the rear and Pro-Line four-rib tires for the front. The rear wheels are 2.175 inches in diameter, and Associated's three-piece front wheels are included. These are a little heavier than one-piece wheels, and it's possible that the extra weight improves steering. Both pairs of wheels come in hot-looking fluorescent yellow.

WORLD-CLASS PERFORMANCE

The Worlds Car performs very much like the Team Car. It's nearly untouchable on smooth tracks, and it can be tuned to handle the roughest ones. Very few cars can match the feel of its steering, although I prefer to use Associated's 25-degree caster blocks rather than the kit's 30-degree ones. The 30s provide great turn-in capability, but can make the car understeer somewhat when it's exiting a turn. For tight, low-speed tracks, I recommend the 25-degree blocks, but stick with stock ones if you run on large, fast tracks.

Your lap times will be quicker; the Worlds Car is lighter, and its chassis and suspension are stiffer than the Team Car's. These changes will be more apparent when you run on a bumpy track. All I can say is, stick with the recommended setup—at least

at first—and your car will be “90 percent there” on just about any track. Associated has given us a “factory ride.” Are you ready to join the team?

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

LETTERS

(Continued from page 8)

a static shot for our “Readers’ Rides” column, try shooting your car in its element—if it’s an off-road racing car or truck, shoot it out in the dirt; if it’s an on-road car, obviously try to shoot it out on the pavement. When shooting the cars, take a look at your background, and make sure it’s not too cluttered; don’t have your neighbors house and fence and kids and dog in the background. Good luck. I’m sure we’ll be seeing your “Readers’ Rides” submission shortly. —Doogie

CAN OPENER

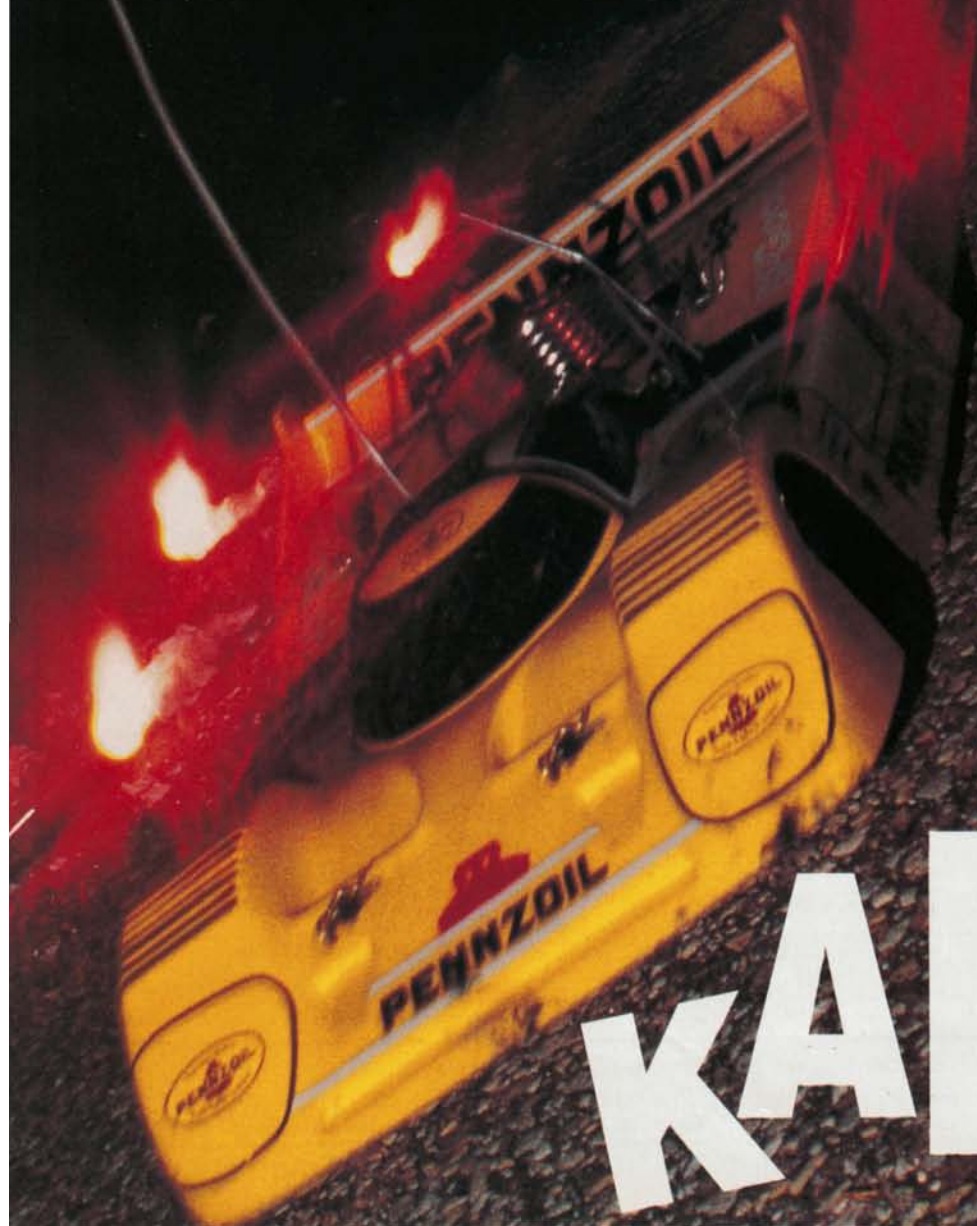
I’m a beginner, and I really like your mag! But I have a problem: how do you get the can open on a modified motor to get to the comm? And what parts of the

(Continued on page 114)



dynamite Apex 10

by JONATHAN BIEBESHEIMER



KABOO

UNTIL RECENTLY, I had spent most of my R/C time with off-road gas trucks. It didn't matter where, as long as there was dirt to kick up and a ton of obstacles to tackle. And bumps? Sure! The more bumps the better! As much fun as trashing a car on this kind of deathly track was, it was just as challenging to prepare it with parts that were beefy enough to handle the beating: lightning-fast servos, dirt-chewing tires and shocks so smooth that (if you were lucky) they'd provide the ultimate ride. Who needed anything else?

Then I got a hold of the new Dynamite* Apex 10 1/10-scale on-road gas car. **It just might change the minds of diehard R/C'ers who are convinced that they'll never leave the dirt!**

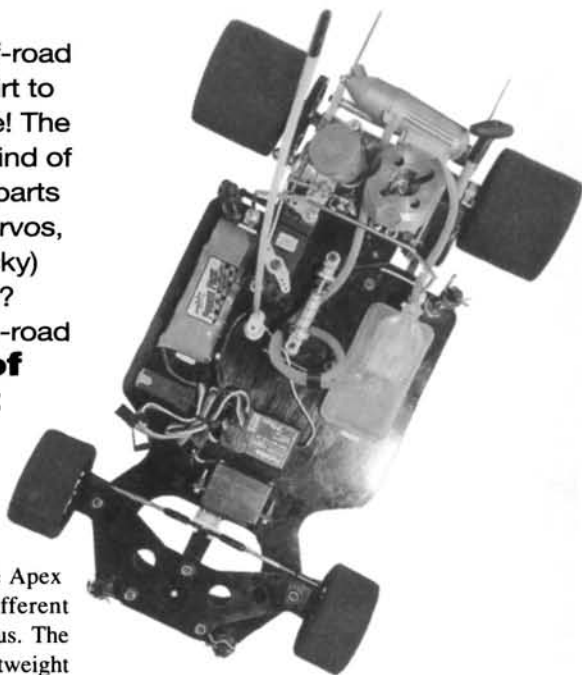
Racing on-road cars is very different from racing off-road cars. Although many of the principles are the same, on-road racing involves precision, both in building and in driving, that takes a little getting used to. A small adjustment can really make a big difference—especially when your car is flying in excess of 40mph! As anyone who builds R/C cars will tell you, careful preparation and building are crucial, and that goes for this car, too. Careless building will not only affect a car's performance, but it will also kill a lot of good racing time by forcing you to make frequent pit stops.

CONSTRUCTION INSTRUCTION

Perhaps the most important tip to follow (printed clearly on page one of the instruction manual!) is to "Use liquid thread-lock on all the screws that go in the aluminum parts." I ran out of thread-lock early and tried to convince myself that an extra crank with an Allen wrench would suffice. Big mistake—my first run was an embarrassing lesson in gas-engine vibrations! Without going into the gory details about what fell off my car, let me just say again: use thread-lock! Dynamite recommends Loctite's* blue formula. It works well for most of the screws, but I suggest that you use the stronger red formula for the clutch nut, which gave me the most problems.

The Apex 10's design is fairly nonsensical, and its construction is relatively easy. The car will offer a few surprises to

anyone who hasn't built a car of this sort, though. For instance, the engine drives the axle directly; you don't have to build a gearbox. The Apex 10's suspension, which is very different from others I've built, is also curious. The front suspension consists of two lightweight springs (about the size of pencil erasers) that compress only about 5mm. The rear suspension is a little more complex. A T-plate that's attached to the main chassis allows the rear of the car to flex from side



As you can see, the Dynamite Apex 10 is very straightforward and easy to work on.

HOT hop-ups

Dynamite offers many options and hop-ups for the Apex 10. I replaced the bushings on the front tires and the rear axle with ball bearings, and I used the Dynamite "Power Pack" for my servo pack; it's small enough to be mounted opposite the gas tank on the chassis. I chose a Futaba* high-speed servo for steering and a fairly inexpensive (but very adequate) Airtronics* servo for throttle. I couldn't get the kit's throttle linkage to function to my satisfaction, so I replaced it with a setup of my own using custom-cut wire links and a bell-crank from Du-Bro*. All current and future kits of the Apex 10 have an improved throttle linkage, so you might not have to do this.

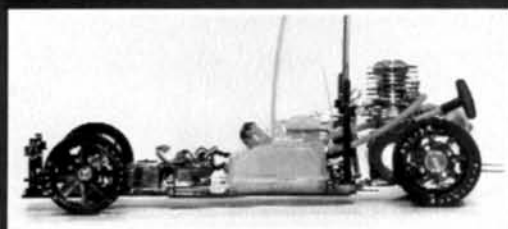
Another option for the Apex 10 is to replace the axle and the rear hubs. There are many after-market axles for the Apex 10 made of titanium, graphite, aluminum and fiberglass. I chose to go with a titanium axle and aluminum rear hubs. Replacing the axle allows you to add a bearing in the center of the spur gear; this makes the diff considerably smoother and, ultimately, the handling is much better.

Last, but not least, I added a set of quick-release wing mounts that simply replace the roll-bar mounts that come with the kit. With the Apex 10, the roll bar is a must to prevent the engine head from being damaged if the car flips. If you use the existing roll-bar mounts (which lock the ends of the roll bar in place with small setscrews), you'll have to cut a slit across the body so that it slides down over the roll bar. If you use the quick-release mounts, the roll bar can be popped on and off more easily. I enlarged two holes in the wing mounts for the roll bar.



I replaced the car's stock roll bar with this quick-release unit. To remove the body, just pop off the roll bar. If you use the stock roll bar, you must cut a slit in the back of the body to remove it.

DM!



DYNAMITE APEX 10

Scale1/10
List price\$199.95 (kit);
\$299.95 (w/TNT .12 engine)

DIMENSIONS

Overall length15.5 in.
Wheelbase10.4 in.
Front width8.3 in.
Rear width9 in.

WEIGHT

Gross (ready to run)2.4 lb.

CHASSIS

TypePan
MaterialFiberglass

DRIVE TRAIN

PrimaryPinion/spur
TransmissionDirect drive
Differential(s)Ball
Slipper clutchNone
Bearings/bushingsBushings

SUSPENSION

Front: TypeCoil-spring/floating
steering block
Rear: TypeT-plate
DampingOil-filled, coil-over shock

WHEELS

Front: TypeOne-piece plastic
Dimensions (DxW)1 3/4 x 1 in.
Rear: TypeOne-piece plastic
Dimensions (DxW)1 3/4 x 2 in.

TIRES

F/R: TypeFoam

POWERPLANT

EngineDynamite TNT .12 (included)
PipeStock

OPTIONS TESTED

Futaba FP-S132H; Airtronics 94102; Futaba FP-R113IP; Futaba PCM 1024 (FP-T3PB); Dynamite Power Pack; all bushings replaced with bearings; axle and rear hubs replaced with aluminum; Pro-Line blue tires tested in addition to Bolink Fastracks (included); Dynamite Lightning Line fuel tubing.

HITS

- Quick turns and great acceleration
- Fairly easy to build and repair
- Many available options
- Incredibly fast

MISSES

- Center shock not supportive enough on rougher tracks

to side. To damp forward movement, a small, oil-filled, coil-over shock is mounted from the main chassis plate to the T-plate. A small silicone damper that spans



Dynamite's TNT .12 engine puts out plenty o' power! Without a doubt, it's extremely durable, and it fired up every time I started it. The supplied Bolink tires were a little too soft for my liking, so I tried running a harder-compound tire.

from the main chassis to the T-plate provides additional support.

The provided aluminum shock is very smooth. I found, however, that the Apex 10 needed a little more support than the shock provided, so I replaced it with a chunkier Associated* .71 shock. I was pleased with the result; the car absorbed bumps in the pavement better; this ultimately made the car's handling much tighter. I recommend that you experiment with a few shocks to find the one that best suits the driving conditions.

TNT POWER

The Apex 10 is powered by the recently released Dynamite TNT .12 engine. It's available with or without a pull-starter. I find that the pull-starter is convenient, and because my racing is more recreational, I'm not too concerned about the additional weight. An engine without a pull-starter is a better choice for serious racers. Dynamite makes a starter box—the "Pro Start"—to fire up your car. It costs about \$100; check it out.

Construction of the car's engine area (the drive shaft in particular) is perhaps the biggest hump to get over, especially if you haven't dealt with gas engines. The pictures that go with the instructions are very clear, however, which is a big help. The complete schematic drawing of the car on the last page of the instructions is great for double-checking your work. It also helped me to communicate with the company when I had questions; I didn't have to refer to a part as "that little nut thingy!"

I experienced the most mechanical problems with the engine area. In all fairness to the company, I had received one of the very first production kits, and there were some natural "teething problems" a car kit goes through when it first comes out. When I spoke directly with the



The author readies his car for yet another attempt at breaking the sound barrier.

people at Horizon (the company that distributes Dynamite Products), they were more than happy to lend support and have already worked very hard to iron out any kinks the Apex 10 originally had.

On the car's first runs, the flywheel kept coming loose from the crankshaft (thus killing any drive to the axle). After several failed attempts to tighten the clutch nut, which holds the flywheel tight against the prop washer, I took a suggestion from a friend and drilled a small hole through the flywheel and slightly into the prop washer. To keep the components locked together, I inserted a small pin in the hole. I used red Loctite when I put the clutch nut back on, and the problem was solved.

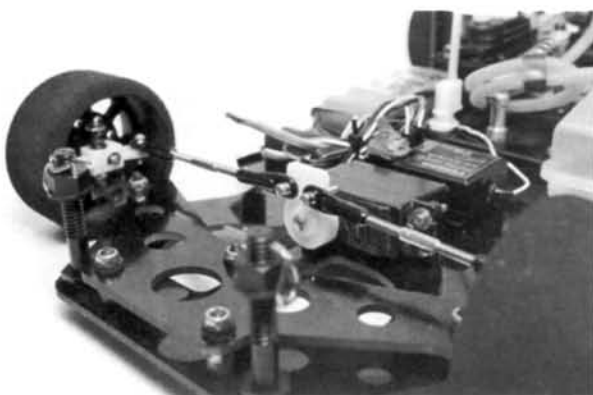
Another problem I encountered was that the clutch bell moved around on the nut. To prevent the clutch bell from sliding in and away from the fly-wheel, use a $\frac{1}{4} \times \frac{3}{8}$ flanged bearing on both sides of the clutch bell (not just on the outside). Otherwise, the clutch bell will work its way in and eventually start digging into the fly-wheel. All Apex 10 kits now have two flanged bearings, so you shouldn't experience this problem.

The clutch nut in my kit was slightly too narrow in diameter, allowing the bell and the pinion to wobble and damage the spur gear. Again, Dynamite has already corrected the problem by including a larger diameter clutch nut.

DYNAMITE PERFORMANCE

The Apex 10 doesn't come with a body, but there are many that will fit it, so the choice is yours! I chose Bolink's* Nissan NPT for the main body, but I also (with a bit of cutting) fit on a few other old electric stock and Formula bodies. I found the Nissan body shape to be the best, however; it helps the car to hug the pavement at high speeds and in gusty winds.

Before you let the tires burn on this car, make sure that you're prepared; Dynamite made the Apex 10 really fun and really fast! Because of the car's low clearance, it's important to find a smooth surface. I tested the Apex 10 on many surfaces. The best one I found was a $\frac{1}{10}$ -mile go-cart track; it provided a great combination of turns and straightaways that really gave the car a run for its money. After breaking in the engine, which is essential with any new gas engine, I began to lean the car in, and I watched in amazement as it went faster and faster with every adjustment. The bulk of the engine sticks out above the body; this keeps it very cool and allows it to run leaner and thus faster. The steering was fantastic, too. I adjusted my radio so that the steering had a fair amount of exponential. If you set the steering to be too sensitive, it's very hard to keep the Apex 10 going straight when it hits top speeds! I'm serious; this car is really fast. And acceleration? Oh, man! The Apex 10 is halfway across the parking lot before you know what has happened!



The Apex 10 uses the same type of front steering/suspension geometry as most popular pan cars.

GET ROLLING!

I found that tire selection was a big issue with the Apex 10. The foam tires that come with the car are really great for a lot of surfaces. They are, however, pretty soft and, therefore, they wear out quickly. After a couple of hours of laps on the track, almost half of the outside front tire had been

chewed off! I needed something a little harder for the rough track. I tried, and was very happy with, a set of Pro-Line*/Jaco blue-dot on-road tires. They have a good amount of stick, but they can also withstand wear from a not-so-smooth track. As with any R/C car, experimenting with things such as tires can really make a world of difference to a car's performance and to how much fun you have racing it.

Dynamite has really outdone itself with the Apex 10. Its features and design make it really quick and fun to drive. The power-packed TNT .12 engine gives you the thrill of speeds of more than 40mph! Although there's room to trick the car out for serious racing, it's simple enough to be a great bet for anyone who has never had gas-car experience. And for those of you who are convinced that on-road racing isn't for you, the Apex 10 awaits you!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

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ALABAMA

Berry R/C Raceway, Main St., Berry, AL 35543; Ronny, Don, (205) 932-3189



Performance R/C Hobby, 2600 A Beltline Rd., Decatur, AL 35603; Ray & Debra Steen, (205) 353-3399



Phenix Raceway, 2006 Opelika Rd., Phenix City, AL 36867; Casey Hoover, (205) 297-0040



R/C Super Cross, 2706 Lagoon Park Dr., Montgomery, AL 36109; Mike Gardner, (205) 262-0048



Spring Cove Speedway, Rt. 1, Box 95, Florence, AL 35630; Chuck or Lyda Syppolt, (205) 757-5998



ARIZONA

Finish Line Raceway, 7025 E. 21st St., Tucson, AZ 85710; Jerry Kikkert, (602) 747-3633



Frank's Hobby House, 19401 N. Cave Creek Rd., Phoenix, AZ 85024; Marty, (602) 992-3495



G&S Raceway, 967 Hancock, Bullhead City, AZ 86442; Bob Olsen, (602) 758-1100



Havasutown Raceway, 1400 S. Smoketree (Rotary Park), Lake Havasu City, AZ 86404; Bernie Coates, (602) 680-7599



HobbyTown Raceway, 9180 E. Indian Bend Rd., Scottsdale, AZ 85250; Dennis, (602) 948-3946



HobbyTown Raceway, 1915 East Baseline Rd., Gilbert, AZ 95234; Kenny, (602) 892-0405



Quarter Flash's Squirtin' Dirt Raceway, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave or Randy, (602) 625-9274



R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85017; Brian Dick, (602) 278-3671



Speedway Hobbies, 1000 N. Humphreys St., #204, Flagstaff, AZ 86001; Gary McAllister, (602) 556-0710



ARKANSAS

Arkansas Int'l. Superspeedway, P.O. Box 1636, Pine Bluff, AR 71613; Joe Pitts, (501) 247-2371



Performance Hobbies, 2222 Spence, Jonesboro, AR 72401; (Rick) Winningham, (501) 935-6501



CALIFORNIA

Brake-a-Way Raceway, 3179 Hamner Ave., Norco, CA 91760; Debbie Burrie, (714) 736-6063



Cats West/Hawk's R/C Raceway, 1201 West 10th St., Antioch, CA 94509; Jerry Winkelbaver, (510) 779-1665



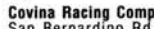
City Speedway, 7750 Convo Ct., San Diego, CA 92111; (619) 560-9633



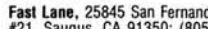
Cloverdale R/C Raceway, 1 Citrus Fair Dr., Cloverdale, CA 95425; Tom Kelley, (707) 586-9789; track, (707) 894-4468



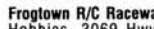
Covina Racing Company, 1611 W. San Bernardino Rd., Covina, CA 91722; Tom, (818) 331-4984



Fast Lane, 25845 San Fernando Rd., #21, Saugus, CA 91350; (805) 255-2404



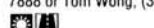
Frogtown R/C Raceway, Motherlode Hobbies, 3069 Hwy. 49, Angels Camp, CA 95222; (209) 736-4989



Greater Los Angeles R/C Racing Club, California State University, Parking Lot A, Los Angeles, CA 90045; Glenn Williams, (213) 734-7888 or Tom Wong, (310) 821-5472



Hobby Haven Raceway, 3983 First St., Livermore, CA 94550; Tom Welding Jr., (510) 443-5828



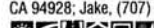
Hobby Warehouse, 5500 So. Watt, Sacramento, CA 95828; Roger Hubbard, (916) 381-7587



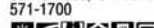
Jake's Performance Hobbies, 6650 Commerce Blvd. #21, Rohnert Park, CA 94928; Jake, (707) 586-3375



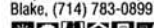
JD Hobbies, 1009 W. College Ave., Santa Rosa, CA 95401; Mike, (707) 571-1700



K&M R/C Raceway, 22474 A Barton Rd., Grand Terrace, CA 92324; Mike Blake, (714) 783-0899



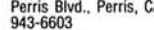
Lodi's Radio Control Speedway, 10033 Black Diamond, Ste. B, Lodi, CA 95240; Mike Belanger, (209) 334-5681



Perris Recreation R/C Track, 120 N. Perris Blvd., Perris, CA 92370; (909) 943-6603



R/C Off-Road Raceway, 10810 Talbert Ave., Fountain Valley, CA 92708; Jeff Paul or Bob Fiege, (714) 965-9615



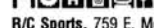
R/C Racing Center and Hobbies, 9842 Channel Rd., Lakeside, CA 92040 (San Diego County); Russ or Cindy Escalera, (619) 443-2270



R/C Sports, 759 E. Monte Vista Ave., Vacaville, CA 95688; (707) 446-5555



Race Prep Raceway, 20115 Nordhoff, Chatsworth, CA 91311; Steve Dunn, (818) 709-6800



RAMS, Murco Plaza, Paseo Padre Pkwy. & Mowry East, Fremont, CA; Mike Alton, (510) 490-8734



RCRC Hobbies, 2069 Pacific Coast Hwy., Lomita, CA 90717; Rhea & Cliff Fisher, (310) 530-7272



So. Cal R/C Raceway, 11930 Valley View St., Garden Grove, CA 92645; Jim Blauvelt, (714) 892-0088



SLO Hobbies, 1356 Madonna Rd., San Luis Obispo, CA 93405; Jim or Ernie, (805) 541-8524



SRS Raceway, 915 N. Main St., Salinas, CA 93906; (408) 424-4044



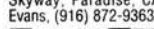
Team Air Racing Club, 18208 Imperial Hwy., Yorba Linda, CA 92686; Don or Nicky, (714) 579-7488



Valley R/C Race Park, 146 S. Santa Fe St., Hemet, CA 92344; Valley Wide Recreation, (714) 654-1505 or 658-4322



Wendy's Country Store and More O.R.C.A. Racing Club, 5475 Skyway, Paradise, CA 95969; Alan Evans, (916) 872-9363

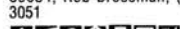


COLORADO

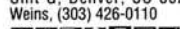
MHOR R/C Raceway, 15540 E. Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151



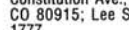
Miracle R/C Speedway, 4206 Wadsworth Blvd., Wheatridge, CO 80034; Rob Brossman, (303) 420-3051



R/C Mini Sports, 6401 Broadway, Unit G, Denver, CO 80223; John Weins, (303) 426-0110



Rocky Mountain R/C Raceway, 5737 Constitution Ave., Colorado Springs, CO 80915; Lee Seigel, (719) 550-1777



CONNECTICUT

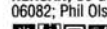
CT R/C Off-Roaders, behind Old Field School, Fairfield, CT 06430; Mike Belmonte, (203) 661-0145



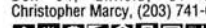
K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; (203) 684-9896



NERCAR, 36 Glendale Rd., Enfield, CT 06082; Phil Olsson, (203) 627-5410



R/C Madness, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (203) 741-6501



DELAWARE

4E Hobbies, 1138 West Dupont Hwy., Millsboro, DE 19966; Peggy Evans, (302) 934-1708



FLORIDA

B+T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-1666



Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758



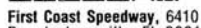
Challenger Speedway at the Willows, Willows Park & Okeechobee Blvd., Royal Palm Beach, FL 33414; Walt, (407) 965-2790 or Mark, (407) 790-6917



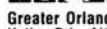
Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; Randy Witte, (305) 474-5934 or Rick Schwartz, (305) 344-1983



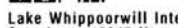
First Coast Speedway, 6410 Waltho Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161



Greater Orlando Auto Racers, 970 Keller Rd., Altamonte Springs, FL 32714; Dave Mottin, (407) 263-4819



Lake Whippoorwill International Speedway, 12345 Narcoossee Rd., Orlando, FL 32827; Bob Hosh, (407) 277-9586; fax, (407) 277-2568



Louie Burton's R/C Raceway, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (813) 665-1322



My Rose, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (407) 744-3800



PBG R/C Motor Park, 6351 Barbara St., Palm Beach Gardens, FL 33410; Doug Gleason, (407) 743-9791



Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



Red's R/C Raceway & Hobbies, Etc. 1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330



River City R/C Car Club, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948



Southwest Florida R/C Raceway, 2425 Rivers Rd., Naples, FL 33964; Clyde Armstrong, (813) 455-1143



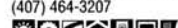
Three Flags R/C Racetrack, 1755 East S.R. 44, Wildwood, FL 34785; Don Meares Sr., (904) 748-3870, fax (904) 748-5263



Treasure Coast R/C Club, 4931 Oleander, Fort Pierce, FL 34982; Lou, (407) 464-3207



West Coast R/C Club, Lake Park, 17203 N. Dale Marry, Tampa, FL 33549; Tim, (813) 932-3650; Bob, (813) 239-9630



GEORGIA

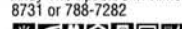
Chafee Park Raceway, 1800 Pearl Ave., Augusta, GA 30904; Darren Brooks, (706) 738-8929



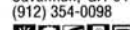
Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699



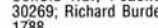
Echeconnee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson/Cliff Kline (912) 788-8731 or 788-7282



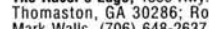
Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912) 354-0098



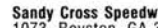
PDQ Raceway & Hobbies, 341 Senoia Rd., Peachtree City, GA 30269; Richard Burdett, (404) 631-1788



The Racer's Edge, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls, (706) 648-2637, (706) 648-6534



Sandy Cross Speedway, Rt. 1, Box 1073, Royston, GA 30662; Morris Phillips or Wayne Fowler, (404) 245-9573



Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; (404) 991-2225



Sugar Bowl R/C Speedway, 5272 North Ave., Sugar Hill, GA 30518; Shelley or Jan Bailey, (404) 945-6709



IDAHO

Capital Dirt Burners, 2440 Menlo Dr., Boise, ID 83702; Jim (208) 383-0426 or Mike (208) 345-3906



Falls Hobbies & R/C Raceway, 1515 Northgate Mile, Idaho Falls, ID 83401; (208) 529-8650



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

Track Directory

ILLINOIS

AJ's Raceway, Kesslinger Road, Dekalb, IL 60115; A.J. Schultz, (815) 756-2772



B.A.R.R., 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615



C&R Hobbies, 39 E. Jones, Milford, IL 60953; Ray Craighead, (815) 889-4073



Centennial Park/LeMont Dirt Burners, 7827 Rohrer Dr., Downers Grove, IL 60516; Scott Moravik, (708) 968-6411



Diehard R/C Raceway, 618 N. Main, Kewanee, IL 61443; Dick Jennings, (309) 854-0701



Hobby Town Raceway, 4611 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth (815) 344-1777



Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311



Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441



Monroe R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597



Peoria R/C Raceway, 518 Hillsdale Ave., Peoria, IL 61604; Ray Tighe, (309) 672-1780



Radio-Active Raceways, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim, (708) 759-7557



Redline Raceway, 921 Harding, Calumet City, IL 60409; (708) 862-8181



Shiloh Eagles Super Speedway, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030



SIRCAR Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885



Slot and Wing Hobbies "Race Place", 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920



Superior Raceway, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073



INDIANA

Blaze'n Race'n, P.O. Box 6, Hamlet, IN 46532; James Berndt, (219) 867-1324



Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901; (317) 452-0163



Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773



K&L Hobbies & Raceway, 3275 North 525W, LaPorte, IN 46350; (219) 324-0353



Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (317) 457-5060



Main Hobbies, 625 Columbia, Lafayette, IN 47901; Randy Palmer, (317) 742-2045



P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666, fax (812) 332-0018



R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



Racer's Choice Raceway, State Rd. 256, Jefferson Co. 4-H Fairgrounds, Madison, IN 47250; Eric Burns, (812) 866-5521



Rimfire Raceway and Hobby Shop, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288/shop, 987-2803/home



The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113



IOWA

Dubuque R/C Speedway, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736



M&M Racetrack, 2434 Pilgrim Path, Oskaloosa, IA 52577; (515) 673-6265



Radio Control Raceway Park, 746 South 30th St., Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780



Sibley Raceway, Osceola County Fairgrounds, Sibley, IA 51249; Allen Reck, (712) 754-2604



Southwest Iowa Hobbies 'n' R/C Raceway, 204 S. Broadway, Red Oak, IA 51566; Debbie Johnson, (712) 623-5513



KANSAS

M&M R/C Superspeedway, 2400 Broadway, Parsons, KS 67357; (316) 421-6742



R/C World Raceway, 217 Brownie Ave., Scranton, KS 66537; Corky or Pam Green, (913) 793-2313



RCRC Raceway, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261



S&K Hobby Shop, 1313 S.W. 21st St., Topeka, KS 66604; Joe Knernschield, (913) 357-0104



Shawnee Hobby & R/C Raceway, 4603 Shawnee Dr., Kansas City, KS 66106; Bill Pugh, (913) 384-3211



KENTUCKY

Bluegrass Int'l/Perry's R/C Hobbies, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE



Checked Flag Raceway, 1790 Bryan Station Rd., Lexington, KY 40505; Billy or Jay, (606) 293-6825



ProTrak R/C Racing, 3451 Cane Run Rd., Louisville, KY 40211; Tony Hardin, (502) 778-2657



West Kentucky R/C Hobbies, 45 Hawkins Loop, P.O. Box 21, Symsonia, KY 42082; (502) 851-3534



LOUISIANA

Cajun R/C Raceway, Rt. 2, Box 288 (Hwy. 343, Bosco) Church Point, LA 70525; Ray Thibodeaux, (318) 873-3855



T&M Pro Hobbies, 9212 W. Judge Perez Dr., Chalmette, LA 70043; Tom/Melodie Barthel, (504) 271-3111



MAINE

Central Maine R/C Speedway and Hobbies, 18 Lithgow St., Winslow, ME 04901; David Prescott, (207) 877-2232



Clay Bowl R/C Hobbies, P.O. Box 61, Greene, ME 04236; Pat Cap, (207) 946-5003



Mementos Hobby Shop, 86 Sweden St., Caribou, ME 04736; (207) 498-3711



MARYLAND

The Track, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630



Woffland Hobbies and Raceway, 2072 Grain Hwy., Waldorf, MD 20601; Perry Pritchard, (301) 870-0293



MASSACHUSETTS

Centerline Hobbies, 167 Corporation Rd., Hyannis, MA 02601; (508) 771-1244



Hi-Tech Hobbies, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373



North East Auto Racers, 4 Graf Rd., Newburyport, MA 01882; Dave Thibault, (508) 699-9587



R/C Hobbies & Speedway, 16 Rio Way, Fairhaven, MA 02719; Toni or Roy, (508) 991-5040



MICHIGAN

Can-Am Hobbies Speedway Park, 1152 Gratiot, Marysville, MI 48040; Don Grinde, (313) 364-3338



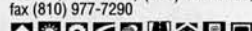
Chatter Box Racing, P.O. Box 164, Old State Rd., Central Lake, MI 49622; Bill Altergott, (616) 544-9829



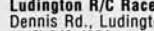
Doug's Dirtway, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 723-3368



JJ's R/C Speedshop, 5713 13 Mile Rd. (corner of 13 and Mound), Warren, MI 48092; (810) 977-0420, fax (810) 977-7290



Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654



Newberry R/C Raceway, RR 3 Box 2860, McMillan, MI 49853; Dustin Hart, (517) 773-5711



Pointe R/C, 2119 Summerton Rd., Mt. Pleasant, MI 48858; (517) 773-5711



R&L Hobbies, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686, fax (616) 329-1744



Scale Racing Center, 3700 Elizabeth Lake Rd., Waterford, MI 48328; Larry Rossi, (810) 683-5529



T/A Raceway, 119 N. Michigan, Big Rapids, MI 49307; Harvey, (616) 796-3217



Village Hobbies-n-Crafts, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374



Westside R/C Raceway, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Oriukowski, (616) 791-9902. (Open May through August.)



MINNESOTA

C/S Speedway, 312 N. Bdwy, Crookston, MN 55716; Caesar Kaiser, (218) 281-6665



Greater Minnesota Rac'n' Place, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768



Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365



Range Racing World R/C Speedway, 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423



Trackside Racing, 2300 Myrtle Ave., St. Paul, MN 55114; Winton Otfelle, (612) 644-3424



Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248



MISSISSIPPI

Crossroads Raceway, 904 Cass St., Corinth, MS 38838; Ronnie Inman, (601) 287-7169



Fast Freddy's Raceway, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315



Joe McFadden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFadden, (601) 483-7000



Rural Hill Raceway, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429



Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST

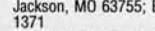


MISSOURI

All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767



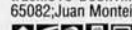
ARC Raceway, 109 South High St., Jackson, MO 63755; Burt, (314) 243-1371



Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238



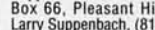
Fast Trax Racing Assoc., mailing: 206 N. Water, Nixa, MO 65714; track: 318 Boonville, Springfield, MO 65082; Juan Montell, (417) 725-4337



Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912



Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828



NEBRASKA

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865

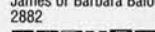


The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmit, (402) 634-3414

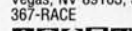


NEVADA

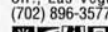
Radio Controlled Race World, 905 So. Rock Blvd., Sparks, NV 89431; James or Barbara Balough, (702) 356-2882



R/C Fever, 3580 Polaris, Suite 2, Las Vegas, NV 89103; Jim or Darin, (702) 367-RACE



Silverbowl Speedway, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577



NEW HAMPSHIRE

Fastracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 352-0811 or 357-8393



Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549



Lake Region R/C Speedway, Lily Pond Rd., Laconia, NH 03246; Louie Blais, (603) 524-2909



Robert's Railroad & Hobbies, Box 431, Rt. 4 at Rt. 152, Northwood, NH 03261; Robert Jeffers, (603) 942-5193



NEW JERSEY

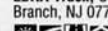
American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Larry Wedemeyer, (908) 446-2010



Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525



LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122



Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)

Spennell Speedway, 2301 Rte. 9 North, Great American Flea Market, Howell, NJ 07731; Mitch, (908) 577-9191



Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717



NEW MEXICO

Las Cruces R/C, 3110 Hillsdale, Las Cruces, NM 88005; Bob Risner, (505) 523-1962



NEW YORK

A&D's FastTracks, 1000 N. Main St., Brewster, NY 10509; (914) 279-2065



Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616



Brookport Speedway, 6000 Sweden Walker Rd., Brookport, NY 14420; Gil & Betty Glidden, (716) 637-6224



Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194



Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-7859



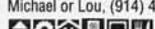
Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140



Competition Hobby Supplies, 1006 Loudon Rd., Rte. 9, Latham, NY; (518) 786-3622



East Coast Barn Stormers, MD #1 Old Oxford Rd., Chester, NY 10918; Michael or Lou, (914) 469-5883



East End Off-Roaders, 7335 Main Rd., Mattituck, NY 11952; Wally, (516) 298-2020



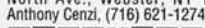
Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940



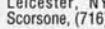
LI 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384



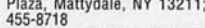
Performance Hobbies Raceway, 205 North Ave., Webster, NY 14580; Anthony Cenzi, (716) 621-1274



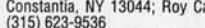
Peter's R/C Raceway, Rte. 36, Leicester, NY 14481; P. Gerald Scorsone, (716) 382-3126



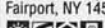
R/C Competition Corner, K-Mart Plaza, Mattydale, NY 13211; (315) 455-8718



R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536



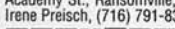
R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722



Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456



Ransomville R/C Raceway, 2576 Academy St., Ransomville, NY 14131; Irene Preisch, (716) 791-8310



Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



Small Torque Racers of Long Island, 24 Horton Dr., Huntington Station, NY 11746; George Franz, (516) 271-1119



South Shore Hobby & Raceway, 311 W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567



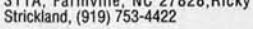
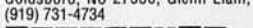
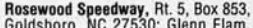
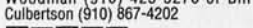
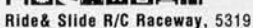
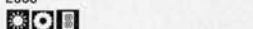
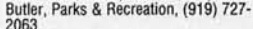
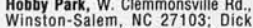
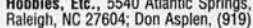
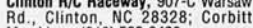
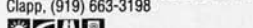
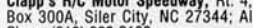
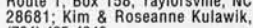
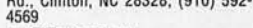
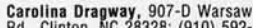
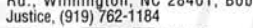
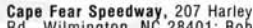
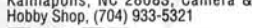
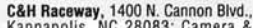
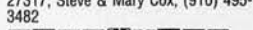
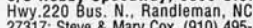
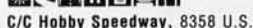
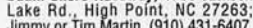
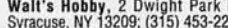
Transit Speedway & Hobbies, 5319 Transit Rd., Depew, NY 14043; (716) 684-7368



Ulster County Speedway, P.O. Box 71, New Paltz, NY 12561; Joe Colombo Jr., (914) 754-7664



Wall's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



Sandhills Raceway Inc., US #1 South, Aberdeen, NC 28315; (919) 944-7414



Hobby Park Dragway, W. Clemmons Rd., Winston-Salem, NC; Jack Wright, (919) 983-9416



NORTH DAKOTA

Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419



Northern Mini Racers, 2105 North Broadway, Minot, ND 58701; Patrick McWethy, (701) 839-8868

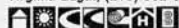


OHIO

Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (216) 499-1300



C/R Hobbies/Top Race Track, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833



D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266



D&S Hobbies Raceway, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112



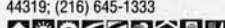
Flag City Raceway, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589



Hobby Mania Raceway, 6597 Route 224, Lovellville, OH 44436; (216) 536-8282



Innovative Hobbies/Lakeside Speedway, 3427 Manchester Rd., Akron, OH 44319; (216) 645-1333



JB Hobby & Raceway, 8760 St. Rt. 201, Tipp City, OH 45371; Bob Curtis, (513) 845-8222



Kent Hobby, 832 N. Mantua St., Kent, OH 44240; Bob Sabo, (216) 673-0422



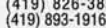
Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818



Lewisburg R/C Raceway, 395 US Rt. 40E, Lewisburg, OH 45338; Gene Butler, (513) 678-9201



T.A.R.C.A.R., 632 Eckle Rd., Perrysburg, OH 43551; Bill Bridges, (419) 826-3859 or Dave Scanes, (419) 893-1916



Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025



OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416



Coweta Hobby & Speedway, 310 S. Broadway, Coweta, OK 74429; Deriald Seabolt, (918) 486-3948



Off-Road Car Assoc. of Tulsa, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528



OREGON

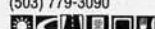
Cathie's R.C. World, 443 So. Calapooia, Sutherlin, OR 97479; Wes/Cathie Buzzard, (503) 459-2746



Competition Racing Assoc., 17941 NE Glisan, Portland, OR 97230; Mark Taylor, (503) 257-0796



Junior Vehicle Speedways, 3090 Starwood Ct., Medford, OR 97501; (503) 779-3090



North Lawrence Raceway, 36 N. Lawrence, Eugene, OR 97401; Gary Hill, (503) 484-9857



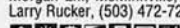
R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188



R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298



Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234



PENNSYLVANIA

CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635



Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045



Clearfield R/C Raceway, 4 Capricorn Ct., Clearfield, PA 16830; Shawn Richards, (814) 765-5608



Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506



DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200



Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052



East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



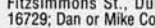
Henning Scale Models R/C Raceway, 128 S. Line St., Lansdale, PA 19446; Bill Henning, (215) 362-2442



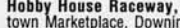
Hipkins Hobbies Raceway, 402 W. Avondale-New London, West Grove, PA 19390; Doug Hipkins, (215) 869-8585



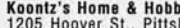
Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765



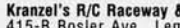
Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (215) 269-1300



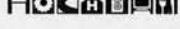
Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223



Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



Modellbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



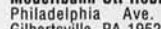
Mt. Laurel Speedway, 835-H Hiester Lane, Reading, PA 19605; Joe Vaccaro, (215) 921-0176



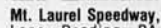
Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



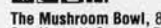
Modellbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



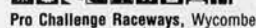
Mt. Laurel Speedway, 835-H Hiester Lane, Reading, PA 19605; Joe Vaccaro, (215) 921-0176



The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe Bruce, or Drew, (610) 444-1850



Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavage and Don Fewkes, (610) 622-7651



Track Directory

TENNESSEE

Action Hobby Shop, 3723 S. Mendenhall, Memphis, TN 38115; Brian Stricklin or Justin Austein, (901) 365-2620



Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 30715; Jamie Pate, (615) 792-4371, ext. 1195



D&M's Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37033; (615) 681-8919



Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630



MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027



Robertson's R/C Raceway, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (401) 424-6423



Tri-County R/C Raceway, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763; Dwaine Romine, Kyle Romine, (615) 376-2330, 376-9955



TEXAS

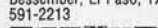
Austin R/C Center, 9702 Gray Blvd., Austin, TX 78758; Caton Cobb, (512) 832-8144



Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Heinz Falke, (713) 399-1527



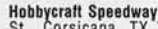
Hal's Hobby Raceway, 1440 Bessemer, El Paso, TX 79936; (915) 591-2213



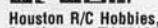
Heart of Texas Hobbies & Raceway, 309 W. Hwy. 190, Copperas Cove, TX 76522; Larry Gholson, (817) 547-7505



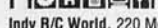
Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761



Houston R/C Hobbies, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006



Indy R/C World, 220 Mesquite Village, Mesquite, TX 75150; (214) 271-4844



Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (512) 861-6105.



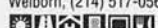
Star Hobbies, 1200 Hwy. 100, Box 5, Port Isabel, TX 78578; Fred Carr, (512) 943-7546



T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562



Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401



Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224



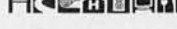
UTAH

Hansen Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; Kevin Hansen, (801) 250-8303



VERMONT

Mike's Hobbies & Raceway, 162 N. Main St., Rutland, VT 05701; Stephen Rachlis, (802) 775-0059



VIRGINIA

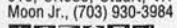
Cooper's R/C Raceway, Rt. 4, Box 122B, Chatham, VA 24531; (804) 724-4182



Crossroads Hobbies R/C Raceway, 1104 W. Main St., Salem, VA 24153; Ronnie Black, (703) 387-3414



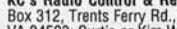
Fairstone R/C Speedway, Rt. 4, Box 918, SR635, Stuart, VA 24171; Pat Moon Jr., (703) 930-3984



The Hobby House, 116 Edds Ln., Sterling, VA 20165; Ron Beckman, (703) 444-0333



KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596



Timberlake Hobbies, 1400 Atlantic Ave., #201, Virginia Beach, VA 23451; Doris Cruza, (804) 491-8016



Trackside Hobbies, 1314 E. Pembroke Ave., Hampton, VA 23669; Rick Cardwell, (804) 731-4170



WASHINGTON



Allie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638



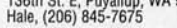
Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary & Sharon Brown, (206) 491-2430



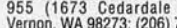
Hale's R/C Raceway Park, 10611 136th St. E., Puyallup, WA 98374; Walt Hale, (206) 845-7675



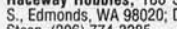
NORA Performance R/C, P.O. Box 955 (1673 Cedardale Rd.), Mt. Vernon, WA 98273; (206) 755-9464



Raceway Hobbies, 188 Sunset Ave. S., Edmonds, WA 98020; Dave or Ron Steen, (206) 774-3285



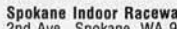
Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838



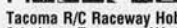
Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matson, (509) 534-RACE



Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; Neil Bade, (206) 565-1935



Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8659

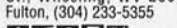


WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487

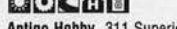


Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355

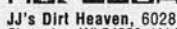


WISCONSIN

ABC R/C, 1441 B East Main St., Waukesha, WI 53186; Dick, (414) 542-1245



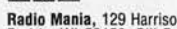
Antigo Hobby, 311 Superior St., Suite 7, Antigo, WI 54409; (715) 623-7655



JJ's Dirt Heaven, 6028 County K, Champion, WI 54229; (414) 866-9096



R/C Hobby Off-Road Track, Lewison Lane, Viroqua, WI 54665; Dan and Diane Sawvell, (608) 637-8221



Radio Mania, 129 Harrison St., North Prairie, WI 53153; Bill Bowes, (414) 392-9515



S&N's Tracks Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

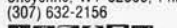


Sparta R/C Raceway, R&S, Sparta, WI 54656; Eric Johnson, (608) 269-6613



WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156

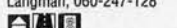


AUSTRALIA

Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 011-6160-247-128

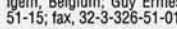


Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128

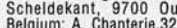


BELGIUM

Cartroubles Indoor Buggy Track, jan Moonsstraat 52-56, 2160 Wommegem, Belgium; Guy Ermes, 32-3-326-51-15; fax, 32-3-326-51-01



Model Racing Club Oudenaarde, Scheldekant, 9700 Oudenaarde, Belgium; A. Chanterle, 32-55-31-36-48; fax, 32-55-30-19-12

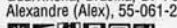


Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855

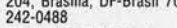


BRAZIL

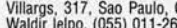
Brasilia R/C Motor Circuit, Estacionamento do Estadio Mane Garrincha, Brasilia, DF 70000, Brazil; Alexandre (Alex), 55-061-273-7205



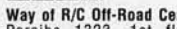
Hobby Center, SQS.210 B.H. Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488



Off Roaders, Av. Guillermo Dummont Villars, 317, Sao Paulo, CEP 05640; Waldir Ielpo, (055) 011-260-5628; fax (055) 011-831-4931

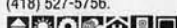


Way of R/C Off-Road Cerrado, Rua Paraiba 1323, 1st floor, Belo Horizonte, Minas Gerais; Claudio T. Correia, (031) 227-6111, fax (031) 227-6869



CANADA

Action Weelz, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756



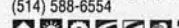
ATN, Auto Teleguidee Nicolet, 2000 Rue Paul Hubert, Saint-Jean-Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097



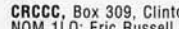
Circuit Pepsi, Centre de Location, 37 du Roi, Sorel, Quebec; (514) 746-8828



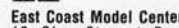
Circuit Teleguide St. Roch, 363-B St. Charles, St. Roch De L'Achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554



CRCCC, Box 309, Clinton, Ontario NOM 1L0; Eric Russell (519) 482-9429



East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island, C1A 8X9; Gary Stephen, (902) 569-3262



Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411



Hobbypro Raceways Ltd., 16020-132 Ave., Edmonton, Alberta T5V-1M1; Tony or Ian, (403) 455-RACE (7223)



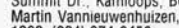
Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530



Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vannieuwenhuizen, (604) 374-1268, (604) 374-8458



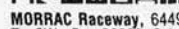
J-T International Raceway, 127 Milligan Lane, Napanee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099



MORRAC Raceway, 6449 Crowchild Tr. SW., Box 30600, Calgary, Alberta T3E 7C8; (403) 254-1386



Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035



Quintrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax: (613) 962-7306



Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateaugay, Quebec J6K 3B4; (514) 698-2151

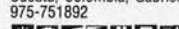


Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855



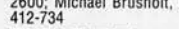
COLOMBIA

Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 975-751892

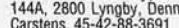


DENMARK

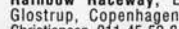
Holstebro R/C Buggy Club, Mozartsvej 7500 Holstebro, Denmark 2600; Michael Brusholt, 011-45-97-412-734



Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691



Rainbow Raceway, Eriksvej. 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504



Thor Minirace Odense, Sohusevej 255, Alleso, Odense, Behind Alleso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707



ENGLAND

Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657



FRANCE

Auto Electron, 35, rue B. de Ventador, Limoges, France 87000; M. Boudoul, 55 062763



F.A.B., rue Jean Baptiste Lebas, 62400 Bethune France; Lericque Gerard, 27-57-48-70



GERMANY

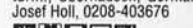
MC Koln, Bottgerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493



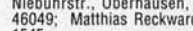
Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609



Oberhausen-Altstadt, Am Fesder-turm, Oberhausen, Germany 46099; Josef Holl, 0208-403676

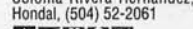


Stoppelhopper Oberhausen, Niebuhrstr., Oberhausen, Germany 46049; Matthias Reckward, 02801-1545



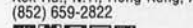
HONDURAS

Autodromo Accion, Quinta Santa Maria, San Pedro Sula, Honduras; Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

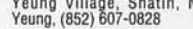


HONG KONG

H.K.R.C. Model Car Racing Club, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822



Kingsville Buggy Arena, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828



INDONESIA

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The Winter Championship races in Florida are traditionally the most important off-road event of the racing season. These races set the pace for the rest of the year, and for car or equipment manufacturers, it is a major indication of how well the rest of your season will run. *Pro-Line* XTR tires were the choice of Masami Hirosaka, who dominated the 2WD Modified class, setting the fast time TQ and crushing the field to take the win. His tire choice was *Pro-Line's* Pro-83 "Flat Fuzzie" (stock no. 8083) in

the now-famous XTR compound. The selection of a *Pro-Line* tire was flawless, as another seven drivers in the A-Main also mounted *Pro-Line* tires on their cars. How's that for getting the popular vote?

In the 4WD class, the story of getting the popular vote was repeated, as the top qualifier and finisher Masami Hirosaka pounded across the finish line on *Pro-Line* XTR compound tires. The most popular combination was a set of *Pro-Line* Pro-83 "Flat Fuzzies" for the rear tires, and Pro-135 4WD "Front Fuzzies" (stock no. 8135) for the front. A deadly combination for traction.

Rounding out the racing event were the trucks. Mark Pavidis was the man to beat. His choice of *Pro-Line* tires was the ticket to a TQ position, as well as a convincing win in the A-Main. Riding on a set of Pro-90 Mini-Pin rear tires (stock no. 8090) and Pro-65 front tires (stock no. 8065), Mark was able to keep the hammer down, all the way to the checkered flag! He had lots of company along the way, as the next eight finishers also mounted up *Pro-Line* XTR compound tires.

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Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674

Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674

Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-6117-53-3662

Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506

Yokata R/C Racers, Yokata Air Base, Tokyo Fussa-Shi, Japan 96326; June Uchiyama, 0425-54-6942

Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478

MEXICO

Alces Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 6-1476, 61477, 86729

Baja Jr., H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gaby Macias, 681-20276; fax, 681-26430

Hobby Centro, 12 De Diciembre No. 3070-A, Guadalajara, JAL 45550; Alejandro Ortiz Del Toro, (36) 21-46-28

Hobby's Formula, Au observatorio 457 DF 01120; (905) 502-3620

Hobby Model's Raceway, Blvd. Garcia de Leon, 1555, Morel, Michoacan 58260; (431) 5-01-22

Jaguar R/C Club, Calz. Zavaleta 116, Puebla 72150; Chema, Denise or Chiro, (22) 31-00-91, (22) 33-00-94

La Hielera, Prol Corregidora Nte 350, Queretaro, QRO C.P. 76160; Jorge Morelos Rabell, (42) 12-15-25

Pista Casino, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhat, (73) 19-12-38

R/C Racing Club, Obsidiana #2900, Zapopan, Jalisco 44560; Fernando Hernandez, (3) 616-73-47

Tony's Track, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, (67) 165708-168141

THE NETHERLANDS

H.F.C.C. Hollandia, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820

NEW ZEALAND

Counties R/C Raceway, Pukekohe Showgrounds, Station Rd., Pukekohe, New Zealand; R. Northcott, 09 23 86904

Papakura Indoor R/C Car Club, 25 Tainere Cres., Papakura, Auckland; Colin Perry, (09) 298-4711

Western District R/C Off-Road Car Club, CNV Bancroft/Akatea Drive, Auckland; Chris, (09) 838-5201

NORWAY

Dalen Raceway, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 64 52 95

PHILIPPINES

Boyer R/C Hobby Shop, Unit No. 10 Lucas Commercial Center, Marcos Hiway, Mayamot, Antipolo, Rizal, Jose "Boy" Chua, 721-2555

Philippine R/C Association, B.F. Homes Paranaque, Metro Manila 1700; Ronald/Manny Villalor, 23-30-08

SOUTH AFRICA

Gordons Bay R/C Club (GBRC), Andrew Norman Sports Centre, Gordons Bay, Cape Province; Andre Hollander, 024-512865

SPAIN

Club Social Sevillana, Crta. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282

Motoclub Castellon R.C., Rafalafena, S/N, 12004 Castellon, Spain; Octavio Traver, (34) 64 229705, (34) 64 237411

Outlaw-Ultima II, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298

ROACR, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); PO Kelly Sexton, 011-34-56-822652

CRAEM, La Elipa, Madrid, Spain; Pablo Llorente, 91-3865952

SWITZERLAND

E.M.B.C.M. Raceway, Main Street, opposite police station, 8854 Siebnen, Switzerland; Markus Schmid, 01-9233621

JMRCV-Terrain du Levant, Chemin ou Levant, 1290 Versoix, Geneva, Switzerland; fax, 19 41 22 7790805

VENEZUELA

Las Fuentes R/C Club, 2da Calle las Fuentes El Paraíso, Caracas, DF 1020; Franco Agrusa, (02) 461-72 55

R/C Mariche, KM4 Zona Industrial, Del Este Via Mariche, Caracas, DF 1070-A; Bruno Morganti, 58-02-241-3969 or 241-4993

Robin R/C Racing Club, Avenida Bolívar CC Luz #1, Valendia, Edo., Carabobo; Fernando León, (041) 223997 or 222386

WEST INDIES

Island Raceway, 8 Mile Post Jacks Hill, St. Andrew, Jamaica, West Indies; Rodney Littau, (809) 926-7034 or 927-1198

RACING TO BRING YOU THE BEST! RACING TO BRING YOU THE BEST! RACING TO BRING YOU THE BEST!



R/C DOCTOR

ANCIENT HISTORY

by DOUG MERTES

HERE'S A QUESTION for you: what do 1993 ROAR and NOR-RCA 1/12-scale national champion David Chester, world record holding drag-racer Terence Holt and thousands of radio-control enthusiasts have in common? Give up? Tamiya* Road Wizards. Ten years ago, these guys were introduced to racing with the predecessor of today's sophisticated Tamiya Formula 1-series cars.

OK, here's another question: where did these guys race? A decade ago, before off-road cars had evolved into the durable, sophisticated, reliable

started looking for a Wizard of my own. Let me tell you, it wasn't easy! Cars of that period weren't taken very seriously, and many were trashed as newer, more complex equipment came on the market. The new stuff was inexpensive and enticing; not many people were interested in old technology.

One night this past winter, Mike Powell, a fellow racer who knows of my passion for F1 racing, told me about a car he had discovered in his older brother's closet. The body was battered, but he was pretty sure that there was a new body somewhere in there, too. Would I be interested in messing around with it?

Months later, he showed up with a grimy but complete Wiz, a new body shell and decals. The tires were so old and dried out that they were practically falling off the rims, but the rest of the car was in solid shape. The price? No charge. Hey, who's interested in paying for old technology, right?

CLEANING IT UP

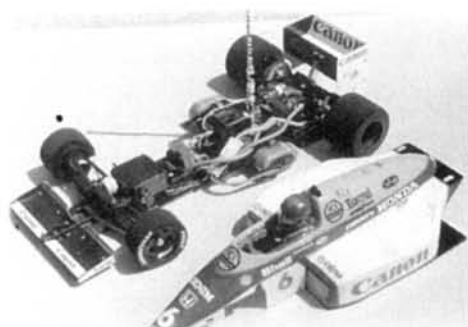
I spent the next few evenings taking the car apart and restoring it to nearly new condition. After I had soaked the tires in lacquer thinner overnight, they came off the rims easily. I slid a new set of stock Tamiya foamies on in their place. Using the buffing brush on my Dremel Mini-mite, I polished all the original aluminum pieces and the kingpins to a chrome-like finish.

The original differential assemblies on these cars were open gear diffs,



Although it's 10 years old, it still looks pretty good!

PHOTOS BY DOUG MERTES

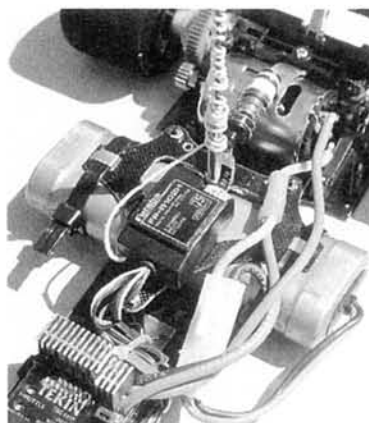


As in modern F1 R/C cars, all the Road Wizard's electronics are compact and fit tightly. I prefer this driver figure to the more recent closed-helmet type because there's more detail.

models we know today, most races were held in parking lots on weekend mornings. As they do at the current Tamiya Championship and the hobby-shop-sponsored parking lot races that have become so popular around the country over the last year, competitors would show up on Saturday or Sunday mornings with a handful of battery packs (equipped with Tamiya plugs, of course!), their radios, chargers and cars. As often as not, those cars would be Road Wizards.

OFF TO FIND A WIZARD

To discover just how good the R/C cars of 10 years ago really were, I

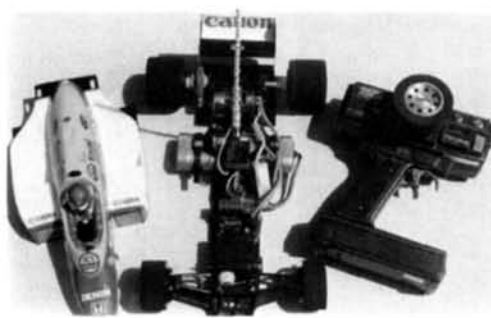


An older ESC, the stock Mabuchi motor and basic AM radio gear and battery pack provide the go-go power for the Wiz.

I soaked the rear bearings in a small jar of Racer's Choice* Bearing Soak for a few days, shaking the jar once or twice a day to agitate the

solution. Then I sprayed them out with motor spray and used some thin bearing oil to make them spin as good as new. The front bushings were history, though—totally worn-out and sloppy. I was glad I had a new set of 8x5mm bushings in my toolbox.

After I had thoroughly washed the body in warm water and dish-washing detergent, I masked it with thin strips of masking tape. I hand-painted the small, hard-to-reach blue and yellow sections. I mixed the yellow myself, using Pactra* Daytona Yellow and a few



Although the pod isn't fully boxed and the flex plate is part of the main chassis, this car still has good road manners.

drops of Competition Orange; I think it comes pretty close to the Camel Yellow the Williams team used at the time. The body and decals didn't come with instructions, but there were a few shots of the Williams car in the *World Atlas of Motor Racing*, so I was able to come pretty close to what it should look like.

As it turned out, even the motor was in decent condition. It needed only a swipe with a Parma* Comm Stick (the only one I've been able to find that will reach the commutator of a Mabuchi-type motor), a thorough spraying with motor cleaner and a little bushing oil. I even dyno'd the thing; it came very close to the performance of one of today's kit motors.

To finish the project, I added an old Futaba* G-plug radio system with a period speed controller and an S-32 steering servo. This stuff is

so old that it creaks when I use it, but it didn't give me any trouble at all during the test sessions.

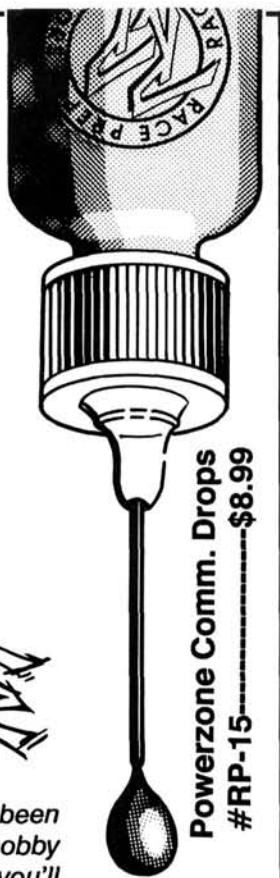
THE VERDICT

Test sessions? As in driving the thing around a track? Yep, one Saturday morning in early spring, I laid out a simple track in the local church parking lot and gave Mr. Wiz four or five battery packs' worth of time on the pavement. I was careful, though; I didn't know how difficult it would be to get parts for a car this old, and I knew that the plastic pieces had to be fairly brittle with age.

From the first turn, however, it was apparent that this car had good road manners. It pushed a little, as expected (look at the amount of caster built into the front end), but it got around the track just fine. Everything works together to produce what I like to call a "happy" car, even though the flex plate, or T-bar, is integral with the main chassis plate, the pod isn't boxed on all four sides, there's no way to control damping or ride height, and the front arms are kind of spindly. With the 17-tooth pinion I had installed, the run time was a lengthy 9 minutes.

So, am I ready to sell all my other F1 cars and take a 10-year-old Road Wizard on the parking lot circuit this summer? No way. I had originally intended to restore the car and give it to a neighborhood kid who's an aspiring racer, but that's not going to happen, either. Instead, I've given him another F1 car; this one is staying on the mantel, where it's safe. My neighbor will still learn to race, and I'll have a piece of history on the shelf!

*Addresses are listed alphabetically in the Index of Manufacturers on page 153. ■



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LETTERS

(Continued from page 92)

RC10 Champ can be dyed? Your info would be appreciated. Keep up the good work.

JACKSON MORTORFF
York Springs, PA

Jackson, to remove the endbell from a modified motor, first remove the two springs and brushes, and loosen the two screws on the endbell. After they have been loosened, you can rotate the endbell and remove it. Pay attention to the number of shims on the armature's shaft, and be sure to reassemble it as it was. It's also a good idea to mark the can so you can replace the endbell in exactly the same position. As for the dyeing, you can color any of the RC10's white nylon parts, like the arms and bulkheads. The shock towers and the bellcranks might not take the color as well, but you could experiment.

—John



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PROJECT 29

Part 3

It looks cool, but does it run?

by MIKE OGLE

WHEN I FIRST started to rehab "Project '29" from a dilapidated barnyard rust bucket, I knew that the old Ford flathead engine had seen better days (and had even been stripped for spare tractor parts!). So, in Part 2, I dropped a shiny, new Pro-Street Parma* hemi between the frame rails. But will the beast actually run, or will it just be another "too pretty for anything but concours" dust collector? So that this roadster can cruise the boulevards with the best of 'em, this month I outfit P-29 with state-of-the-art electronics and some righteously plump street rubber!

I chose Pro-Line* Striker tires because of their great looks and performance, but I had to find a way to mount them on the car. Because they're designed with a bead (for use on off-road-style rims), I had to do some work. I modified HPI* Superstar RC10 off-road rims so that they would fit the Parma on-road hubs and axles.



DIALED-IN DIFF

2 Now slide the blue thrust washer and the steel washer over the threaded end of the axle, and tighten the diff nut. The wheel is now part of the working diff. To prevent the wheel from spinning against the diff hub, screw a small socket-head screw into an old wheel-mounting hole. This will catch on the inner moldings of the wheel spokes to lock it into place.



STICKY STRIKERS



1 Start by grinding away the wheel-centering flange on the Parma aluminum hubs so that the new wheels will fit flush against them. Drill out the diff-side wheel to 1/4 inch to allow the axle's threaded end to stick through it.

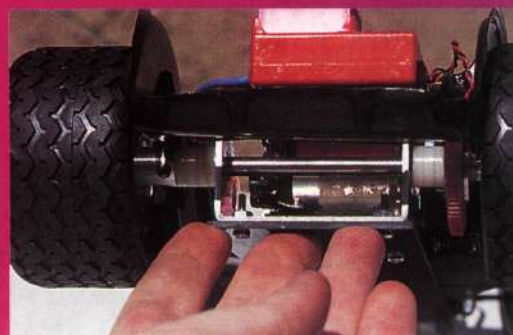
THREADS FOR TREAD



3 To bolt on the left rear wheel, first thread the hollow axle with an 8-32 tap. Then tighten the wheel to the hub with a bolt that's 2 to 3 inches long. Be

sure to use thread-lock on the bolt, or it will come loose after a few burnouts.

I found that three spacers on the diff side and four on the left provided adequate clearance for the fat new treads.

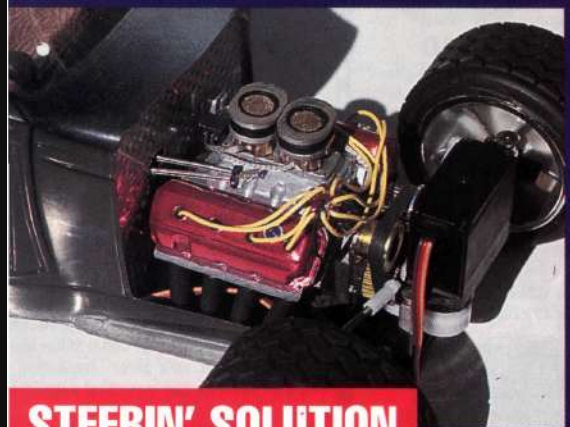




RADIO WAVES



6 The JR* Alpina AM receiver fits nicely under the side passenger seat, and the Parma under-body antenna web is mounted right above it. With the antenna wire mounted under the passenger's seat, the P-29 keeps its realistic look.



STEERIN' SOLUTION

7 After I had installed the Parma hemi motor, it dawned on me that I had just used up a good amount of chassis space—space where the servo would normally go! So, after examining all the options, I decided to mount the servo so that it was vertical and upside-down on aluminum stand-offs in the front grill, where it masquerades as a chunky little radiator. This worked out very well; it just clears the front of the hemi motor, and it even allows room for a small Kimbrough* servo-saver for added safety.



FREE ROLLIN'

4 Drill out the front wheels (which are actually RC10 rears) to fit standard 1/4x1/8 wheel bearings. You could also use the bronze bushings that are supplied in the kit. Make sure you do this on a good drill press, because it's almost impossible to drill a straight hole by hand. If the holes aren't dead-on center, the roadster will have a little front-end wheel shimmy.

ROOSTER PERCH

5 Mount the Novak* Rooster ESC on a small Kydex shelf on top of the motor pod. This setup keeps the wires short and allows a little breathing room around the large, purple-anodized heat sink for "cool running."



BODY BY...



8 When all the electronics are in place, the body will cover everything. Now we have to finish the bodywork. In Part 4, I'll show you, step-by-step, how to do a classic flame paint job.

SCOPING OUT

HITEC SP-520

by JOHN RIST

WHICH kind of electronic speed controller (ESC) should I buy: a reversing one or a racing one? This question is often asked by newcomers to the R/C hobby who consider getting ESCs when the mechanical speed controllers in their relatively new, entry-level, off-road vehicles burn out. These mechanical controllers work well for a while, but the combination of high speed and rough terrain forces the current to ballistic proportions, overloads the contacts and causes them to arc and eventually fry.

Now, back to our ESC options: reversing and racing. Let's look at the differences between them—the most obvious being that one has reverse and the other doesn't. So what's the big deal about racing ESCs if they're missing something? The big deal is performance!

DIRECTION ON DIRECTION

In a reversing ESC, the FETs (power-handling transistors) are divided into four groups that form a switch that can send current in either direction, so the car can run forward and backward. In a racing ESC, all the FETs (except the braking one) function as one group to deliver all the battery juice to the motor.

So do you want reverse, or do you want every drop of power to flow to your motor, as needed for all-out racing? For my favorite backyard car, I prefer a reversing speed controller. I'm not the world's best driver, and when my car gets stuck against a tree or a curb, it's easier to free it by hitting reverse than by hiking over to turn it around.

This brings us to this month's Scoping Out topic—Hitec's* SP-520 reversing ESC. It's an ideal replace-

ment for the mechanical speed controllers found in most entry-level cars.

KEEP IT COOL

The biggest problem with reversing ESCs is that they get very hot. This heat is generated by the extra power that the ESC consumes because the FETs are divided. To solve this problem, Hitec engineers installed a massive heat sink in the SP-520.

Another problem with reversing ESCs is that you can't use one heat sink to short between groups of FETs, so most manufacturers use insulated tab FETs. A solid aluminum heat sink is then installed using spring clips. Because of the inefficiency of the insulating tabs and the poor surface contact of the spring clips, this arrangement often runs *very hot*.

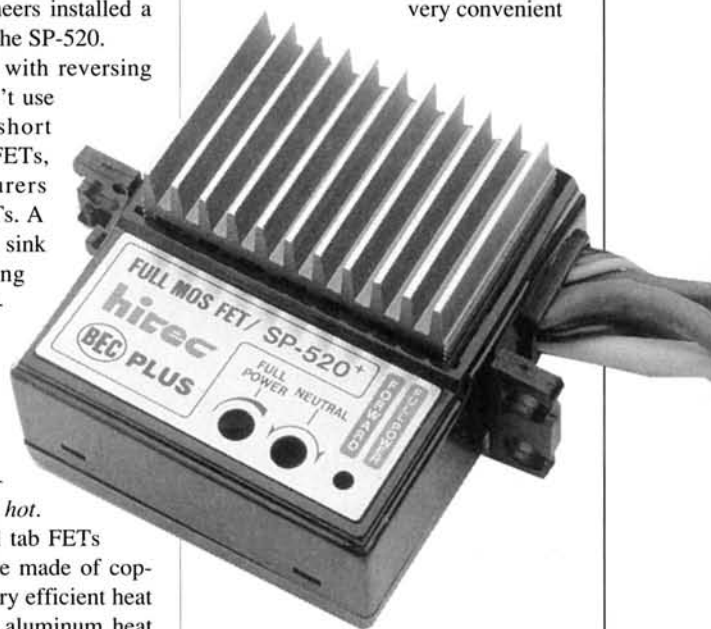
Hitec uses raw metal tab FETs (the tabs appear to be made of copper) that provide a very efficient heat path. To prevent the aluminum heat sink from shorting the various groups of FETs together, Hitec has placed a silicone-rubber boot between the heat sink and the FETs. Silicone rubber is an ideal material for providing electrical isolation: it's an excellent heat conductor and it's soft, so it offers full surface contact between the FET's heat tabs and the heat sink.

WHAT'S INSIDE?

The SP-520's case snaps together (no screws). By running my fingernail under the edge of the case, I was able to open the controller easily. Inside is a combination of surface-mount components and through-hole

components. Both sides of the printed circuit board are full of components. All the solder joints looked good, and all the printed circuits in the path of heavy current are massive. Hitec has packed an amazing amount of electronics into a small package.

The SP-520's case has servo mounting ears that make it very convenient



to mount it in place of a throttle servo. In cars that are cramped for space, the servo ears get in the way, but they're easily removable; simply slip them out of their slots, and snap the case back together.

PUTTING IT TO THE TEST

• **Test 1.** With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's "on"

Making Connections

On the SP-520, there's nearly a 2:1 difference between the end-to-end and the 2-inch resistance readings. Hitec's instructions mention that it's possible to eliminate or change connector types to improve performance and that it's best to solder the motor wires directly to the motor, without using bullet-style connectors. They caution, however, that you should take great care when doing such tasks. Before trying to make a change, carefully study the wiring diagram in the instructions. Reversing or swapping the motor and battery connections can destroy an ESC in a heartbeat.

When I get serious about improving performance, I always wire my motor connections directly to the motor without using bullet connectors. This also shortens the motor wires. For battery connections, I use Litespeed® racing connectors. These low-loss connectors are reasonably priced, but they're not factory polarized, so it's possible to plug them in backward. The SP-520 has reverse-voltage protection, but if it's hooked up backward, it will get extremely hot, and you'll have to disconnect it quickly. To avoid this problem, polarize your connectors by interlocking the shell halves with a drop of CA. Also, if you use Litespeed-style connectors, be careful when you clean your motor because most motor cleaners will destroy the shells.

resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs. Low "on" resistance reduces power loss at high speeds. In an ESC, wasted

What it Has

- Reverse
- 12 current-handling FETs (eight for forward; four for reverse)
- Battery-eliminator circuitry (BEC)
- Two adjustment potentiometers (neutral and full speed)
- Servo-style mounting ears (easily removable)
- Tamiya-style battery connectors and bullet-style motor connectors
- Automatic thermal shut-down
- Built-in, two-color, pulse-checking LED
- Comes with motor capacitors, instructions and a screwdriver

HITEC SP-520

DIMENSIONS

Height (w/heat sink)1.15 in.
Width (w/out servo ears) ...1.60 in.
Length1.85 in.
Weight (w/wires & heat sink) .3 oz.

TUNING

Access to controlsGood
Ease of adjustmentGood

LIST PRICE\$89.95

ELECTRICAL (Hitec specs)

Max. voltage (7 cells)8.4 volts
Min. voltage (5 cells)6.0 volts
Max. current560 amps

Continuous current140 amps
Resistance0.0125 ohm

TEST PARAMETERS

Voltage6 volts
Current12 amps

VOLTAGE DROP

—along length of wires ...0.42 volt
—2 in. along wires0.26 volt

CALCULATED RESISTANCE

—along length of wires ...0.035 ohm
—2 in. along wires0.021 ohm
BEC voltage (6 cell pack) 6.08 volts
Resistance = voltage drop / current

Comments: during my lab tests, Hitec's SP-520 got hot, but not hot enough to activate the automatic thermal shut-off. During my road tests, the SP-520 performed extremely well and, thanks to its heat sink, it stayed cool. Hitec is noted for making reasonably priced products that work well, and I think the SP-520 lives up to this standard.

power shows up as heat, so low "on" resistance means cool running.

—End-to-end voltage drop: 0.42 volt—a resistance of 0.035 ohm.

—Voltage drop 2 inches along the wires: 0.26 volt—a resistance of 0.021 ohm.

The SP-520's "on" resistance is higher than those of all the premium (Cadillac price and quality) ESCs I've tested. But it's lower than several budget-priced ESCs. Being budget-priced itself, the SP-520 is a good buy.

• **Test 2.** I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps. At the end of this grinding 15 minutes, the SP-520 was quite hot (uncomfortable to touch),

but it was by no means scorching, as I had expected. This is a testimony to the efficiency of the heat sink.

GET READY TO RUN

The best part of testing is the driving, so I installed the SP-520 in my test car. The

installation instructions are brief but very thorough. Read them carefully, and you should be able to install the ESC easily. It took me only 5 minutes to install the SP-520 in my car.

My test car is set up with bullet-style motor connectors and Tamiya-style battery connectors. It also has a large flat area on its top plate that makes it easy to secure the ESC with double-sided tape. The switch can be mounted with two screws, but it's housed in a fair-size plastic case that makes it easy to tape it to the top plate near the edge.

My car is already set up with three 0.1-microfarad capacitors across the motor. If you don't already have capacitors on your motor, install the ones that come with the SP-520. This task requires good soldering skills; if you don't have such skills, get help from a friend or a hobby shop.

I ran into a minor problem when I tried to match the SP-520 to my transmitter. The trigger on my transmitter can be set for more travel in forward than in reverse. With this arrangement and with all the trims set at center, I wound up with full forward control and no reverse. I shifted the trims toward reverse and readjusted the neutral potentiometer to establish a solid neutral. I then had a strong forward

and a weak reverse. Next I adjusted my transmitter trigger for a 50-50 forward and reverse travel, and I adjusted the SP-520's neutral and high speed potentiometers one last time. Finally, I had a solid forward and reverse.

IN CONTROL

With several charged battery packs, I headed out to give the SP-520 a heavy workout. I started with a 7-cell pack and fairly high gearing (go-fast gearing), and I ran the car across a combination of pavement and grass. Grass is the worst terrain to run a car on; the drag on the chassis puts a strain on—and can fry—the motor. From the very first squeeze of the trigger, my test car exploded down the road. Its acceleration was great, and its speeds were topnotch.

The SP-520 has a 0.45-second delay between forward and reverse. I think this is good because it reduces the strain on the transmission when you're banging between forward and reverse. There's no delay between reverse and forward, though, so you can slam from reverse to forward for wheelie-popping fun.

To test an ESC for radio interference, I drive the car a long way down the pavement. I watch closely to make sure that the steering stays smooth and the motor doesn't surge. The SP-520 was as smooth as silk all the way to the end of the run.

To test an ESC for bad habits, I run the battery to a complete dump. The SP-520 never stopped working. I had steering right up until the battery got so weak that the car stopped, and the ESC didn't exhibit runaway tendencies.

After the first run—a 5-minute dump—the motor was extremely hot. Running through the grass had just about wiped out one of my favorite motors. The battery pack was a little warm, as you'd expect after a hard run. The big surprise was that the SP-520 was only slightly warm. It seems that Hitec's patented heat-conductive silicone-rubber boot and lightweight aluminum heat sink do a good job of keeping things cool.

The SP-520 is a big-bang ESC for the dollar. Even though it's one of Hitec's lower-priced reversing ESCs, it performed extremely well in my road tests. So, if you have a scale project or a backyard burner that's demanding a reversing ESC and your hobby funds are limited, the SP-520 may be just the one for you.

*Addresses are listed alphabetically in the Index of Manufacturers on page 153.

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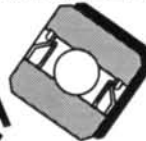
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